Understanding the Digital Music Commodity

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ABSTRACT

This dissertation concentrates on the changing form of the music commodity over the last two decades. Specifically, it traces the transition from music on compact discs to music as a digital file on computers/mobile devices and the economic, industrial, aesthetic and cultural consequences this shift has for how we produce, present, and consume music. As computers became viable sources for the playback of popular music in the 1980s and 1990s, the roots of the digital music commodity took hold. Stripped of many of their previous attributes (i.e. album art, compressed sound, packaging, etc.), recordings as digital files were initially decontextualized commodities. On computers, music underwent an interface-lift, gradually getting redressed with new features (i.e. metadata, interfaces, digital "packaging"). This dissertation focuses on five technologies – Winamp, Metadata, Napster, iTunes and Cloud Computing – that were key to rehabilitating the music commodity in its digital environments. These technologies and the cultural practices that accompanied them gave music new paratexts and micromaterials that ultimately constituted the digital music commodity. Through case studies, generative archival research, and descriptive analysis, this study makes methodological and intellectual contributions to the field of communication and technology studies as well as to studies of new media and the cultural industries. By teasing out the differences between the commodity aspects of the CD and the digital file, this project offers fresh perspectives on materiality, aesthetics, labour and ownership in an era of digital goods. Digital music's fluid and ubiquitous nature seems to subvert those who seek to profit from it. But while digital music offers the potential to disrupt the traditional ways of doing business in music, it also affords new forms of control and power. This has not stopped artists, hobbyists and users from carrying out creative experiments that call into question the codes and conventions of the digital music commodity. In doing so, they make visible the promise of digital music: to turn our attention to the commodification process and to force a reconsideration of the role music plays in the contemporary moment.

RÉSUMÉ

Cette thèse de doctorat examine la transformation du produit musical au cours des deux dernières décennies. En particulier, elle illustre la transition de la musique inscrite sur disque compact en fichier numérique disponible sur ordinateurs ou appareils portables et s'intéresse aux conséquences économiques, industrielles, esthétiques et culturelles que cette transition a provoquées en regard aux manières avec lesquelles on produit, présente, et consomme la musique. Dès lors que les ordinateurs ont été en mesure de jouer de la musique populaire au cours des années 1980 et 1990, les bases d'un bien musical numérique ont pris racine. Dépourvue de nombre de ses anciennes caractéristiques (ex. les illustrations, l'information contextuelle, l'emballage, etc.), la musique de format de fichier numérique était, au départ, un bien décontextualisé. La musique présentée sur ordinateur est passée au travers un processus de mise à jour de l'interface marqué par l'insertion de nouvelles caractéristiques (ex. les métadonnées, les interfaces, « l'emballage » numérique). Cette thèse de doctorat focalise sur cinq technologies – Winamp, les métadonnées, Napster, iTunes et l'infonuagique – ayant joué un rôle central dans la réadaptation du bien musical dans son environnement numérique. Par l'entremise d'études de cas, de recherche en archive et d'analyses descriptives, cette étude propose une contribution méthodologique et intellectuelle aux domaines de la communication et de la technologie ainsi qu'aux études sur les nouveaux médias et les industries culturelles. En cernant les différences entre les aspects du disque compact et du fichier numérique les caractérisant comme biens, ce projet offre une nouvelle perspective sur la matérialité, l'esthétique, la main d'œuvre et la propriété à l'ère des biens numériques. Bien que la musique numérique ait le potentiel de bouleverser les modèles d'affaires de l'industrie musicale, elle crée aussi des nouvelles formes de pouvoir et de contrôle. Cela n'a pas arrêté les artistes, amateurs et usagers de produire des expériences créatives questionnant les codes et conventions du bien musical numérique. Ce faisant, ils rendent visible la promesse de la musique numérique : c'est-à-dire, d'attirer notre attention sur les processus de marchandisation de la culture et de forcer une reconsidération du rôle que joue la musique dans le moment contemporain.

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INTRODUCTION

FORTUNE TELLING

The last two decades have witnessed a steady move from music on compact discs towards music as a digital file on computers, the Internet and various mobile and electronic devices. This migration has economic, industrial, legal and cultural consequences for how we produce, present, distribute and consume music. Moreover, it has implications for the nature of the music commodity and the ways in which music's commodity form affects our experience of music more generally. Accordingly, this project traces the emergence and development of what I call the digital music commodity: a particular combination of data and sound that exists as an entity in and of itself for sale or acquisition in online outlets via computers or other digital portable devices. The evolution of the digital music commodity is a telling example of how shifts in technology and social life are written in — and can be read from — music and other such cultural commodities. Music's digitization is a story of convergence, one that connects industrial production, popular culture, technology and commerce. It is a narrative that concerns the aesthetics of music and computers, the labour of producers and users, the value and ownership of digital objects, and the codes and conventions that govern the "digital economy" more broadly. Like the CD before it, the digital music commodity is slowly starting to stabilize as a format for the circulation and consumption of music. Even so, the contours of its form are still taking shape. This dissertation is a record of this flux; a transcript documenting the shared fate of music and computing over the last two decades and what this union has meant for both.

In some ways, the shift to digital music can be summed up in a song. "Crystal Ball" is the first song from Prince's 1998 four-disc epic album of the same name. As could be expected from the Artist formerly known as a symbol, the song is a quirky piece of art-rock that meanders for over ten minutes and touches on issues as wide-ranging as war, spirituality and sex. But the story the song has to tell is as much technological and industrial as it is musical. A vocal critic of major record labels and their business strategies, Prince saw *Crystal Ball* as an opportunity to use new technologies to skirt the traditional constraints of record production and distribution (Kot, 2009). Prince's plan revolved around creating a website for fans to visit and pre-order the album. Once enough pre-orders came in — 100,000 to be exact — Prince would press the album and send it out (Strauss, 1997). The four-disc album even came complete with packaging that folded into a 3D, transparent crystal ball (Murray, 1997). The one-time bulk order would drastically cut down on manufacturing and marketing costs and, best of all for Prince, he could fund the shipping with money from the pre-orders (Strauss, 1997). Excitedly and idiosyncratically, Prince announced the initiative on his website: "Dig if u will the picture: the first release by a major artist solely on the Internet […] Call 1-800-Newfunk now 2 order. This is how a record company should work" (Prince, 1997; Strauss, 1997). Despite his optimism, Prince's foray into new technologies and alternate distribution largely backfired. Fans who pre-ordered *Crystal Ball* ended up waiting over 8 months for enough pre-orders to accumulate (Reiss & Nelson, 1998). Adding insult to the long delays, copies of the album started appearing in mass retailers like Best Buy, Blockbuster and MusicLand very shortly after mailing of the pre-ordered album began, leaving disgruntled fans wondering why they raced to order early ("Blockbuster Signs Deal", 1998; Glaister, 1998).

Crystal Ball was a digital idea but it still relied on an older form of the music commodity (i.e. the CD). The halfway-ness is a fitting encapsulation of three basic assumptions that orient this dissertation more broadly. First, the music commodity has been rapidly and significantly re-shaped by its relationship to computers and other digital devices. While music has always depended on the technologies of its production, distribution and playback, the level of this dependence has increased dramatically. Evolving digital music technologies have taken on many of the characteristics of computing more generally, and this has led to a series of innovations, interfaces and ideas for music that re-orient the role of music in our lives. This shift has, for some, been an opportunity to alter their relationship with the industries that have traditionally controlled the production and distribution of the music commodity. Just as Prince's *Crystal Ball* tried to subvert the regular business of the music business, the move to a digital music commodity has been a promising opportunity for many musicians, users and entrepreneurs. At the same time, music's new format has also enabled producers of the music commodity to seek out even greater control and ownership over the flow of music than they have experienced previously. The digital music commodity opens up greater opportunities for surveillance, advertising, consumption and technological interference.

Second, and perhaps contradictorily, music's commodity form still matters in the digital realm. Although digitization implies a kind of de-materialization of the music commodity, the force and the pull of music's commodity form are still very much present in the digital realm. The digital music commodity is not immaterial, rather the transition to music as a digital file represents a turn towards micromaterialization: towards the informational and infinitesimally small layer of materials that make up digital culture. Just at the materials of the CD commodity shaped the possibilities for the experience of music in that format, the micromaterials of the digital music commodity govern its circulation and consumption. Prince's *Crystal Ball*, for example, was hampered by reproduction costs, shipping troubles, and proper distribution mechanisms. As much as it looked forward to a day when artists could deliver music directly to consumers via the Internet and computers, it was still bound by the very non-digital materials and conventions of the CD commodity. Similarly, the possibilities of the digital music commodity are tied to its material attributes and these materials mediate our relationship with music.

Finally, *Crystal Ball* reminds us of the strange mix of the new and the old that accompany the process of innovation. It is hard to ignore the irony lurking in the combination of "solely on the Internet" and "call 1-800-Newfunk 2 order". Prince's high tech release strategy relied as much on phones, the postal service, and retail stores as it did on the Internet. Of course, these were still the early days of Internet commerce, so it was not absurd that the newest technology on the block was primarily used to direct traffic to much older and more familiar technologies. Technological innovation is almost always a series of small steps rather than a distinct break, and Prince's album launch shows just how much overlap there is between the past and the present. With its awkward mix of new and old, *Crystal Ball* suggests that, in 1997, neither the technology nor the cultural practices of music production and consumption were ready for music released "solely on the Internet".

Prince's experiment — neither the first or the last attempt by a musician to user computers and the Internet to market and sell music — stands in for a whole series of false starts, honest attempts and misguided stumbles that have characterized the move towards a digital music commodity. *Crystal Ball* was just that: an attempt to gaze into the future of music, but one that was ultimately a little fuzzy. It was evidence that the building blocks for the digital music commodity were starting to assemble and music's transition to the computer was beginning in earnest.

UNDERSTANDING THE DIGITAL MUSIC COMMODITY

This dissertation focuses on the decades that bookend Prince's *Crystal Ball* and on the different technologies that prepared and conditioned music for the computer. Specifically, this dissertation tracks key moments in the emergence of the digital music commodity; moments in the music commodity's history where most of the materials that give it its commercial, aesthetic, technical and functional form manifest themselves largely thanks to computers, the Internet or other digital technologies. The music on CDs is, of course, digital. Hardly an "mp3 revolution" (Selvin, 1999), the transition from digital audiotapes to CDs to computer files has been unfolding for nearly thirty years. However, the CD commodity — the packaging, the disc and the jewel case — is not. CDs come with retail stores and manufacturing plants, distribution trucks and store shelves. Digital music files of recorded popular music on computers, on the other hand, are essentially data without their tactile packaging: ones and zeroes, bits and bytes that, together with the right software, play music. Much of what makes the CD and previous forms of the music commodity appealing (i.e. album art, physical packaging, etc) is gone or greatly reduced. In place of this packaging – what Will Straw (2009) refers to as the CD's paratexts – new information and attributes arise to give the digital music commodity its unique specificity as a format for the consumption and circulation of music.

By most accounts, this transition will be remembered as one of extraordinary, though not unprecedented, upheaval for individuals and institutions involved in making, marketing, distributing, selling and consuming recorded music (Burkart & McCourt, 2006; Chanan, 1995; Garofalo, 1999; Steve Jones, 2000b; Sterne, forthcoming, 2012; Théberge, 1997; Tschmuck, 2006). The digitization of music has wide-reaching cultural, structural and legal implications. As digital formats alter music's materialities and capabilities, alternate practices of making, marketing, and listening to music evolve (Katz, 2004; Théberge, 1997). Digital music commodities also bring structural repercussions (Burkart & McCourt, 2006; Garofalo, 1999). The music industry, broadly conceived, is in a seemingly constant state of re-organization. It is alternately responding to and trying to bring about new uses, contexts and practices for music (e.g. cell phones, satellite radio, mp3 blogs, podcasts, video games etc.). Digital music files also raise important legal issues that impact how markets function and how consumers experience music in their lives (Fisher, 2004; Gillespie, 2007; Lessig, 1999, 2002, 2004; Vaidhyanathan, 2003; Zittrain 2005, 2008). Existing copyright legislation, technological protection measurements, and similar policies bump up against the fact that, as digital data, music is as readily transportable and downloadable as many other electronic files.

Some musicians, labels and consumers jumped head first into the digital music scene; others did so with trepidation or outright resentment. Entrepreneurs and technologists trying to predict music's future put forth new business models, hardware and software — most with only crystal ball-like accuracy. Even though, now in 2010, the commercial digital music market seems to slowly be stabilizing, the digital music commodity continues to take shape. The broader industrial, social and technological changes that *Crystal Ball* hinted at are far from finished. Previous staples of the business — radio, physical retail outlets like Tower Records or Sam the Record Man, music television stations like MTV and Much Music, etc. — are no longer the cultural or economic forces they once were, at least for promoting and selling music. In their stead, ring tone makers, computer hardware and software producers, Internet service providers, social networks, and a host of other new businesses have taken an interest in the business of music, each with their own divergent visions for the digital music commodity. As a result, the assemblage of institutions, actors and technologies that comprises today's "music industry" is a refracted reflection of the one in which *Crystal Ball* emerged.

The digital music commodity emerged in large part as a result of the confluence of music and computing technologies. The development of personal computing in the 1980s and the subsequent drive towards multimedia were integral for making music playable in the new environment the computer provided. As computers became increasingly viable sources for the handling and playback of sound recordings, music began its complicated migration from compact disc and other older formats to music as a digital file. Music took on the properties of software and got tied up not only with the technologies of computing but with the utopian discourses that surrounded personal computing. Digital music was more than just music; it was a tool for personal expression and an act of defiance against an out-of-touch music industry. Moreover, on computers and the Internet, the recorded music commodity was stripped of many of its previous signifiers and materiality. Music in its digital form initially seemed like a decontextualized version of its former self; an opportunity for a total re-envisioning of how music distribution and consumption took place. However, as hardware and software for handling music on computers developed, music underwent an interface-lift. It was gradually re-dressed with features that recalled its previous commodity form (i.e. metadata, interfaces, "packaging"). The transition to computers, then, was a kind of zero moment for music, a temporary and transient point in time in which the codes and conventions that governed the circulation and consumption of music as a commodity were in flux, albeit not subject to a complete re-imagining.

Technologies like Winamp — one of the earliest computer media players — and metadata — information about the information on CDs and digital files — emerged to fill music's emptied material markers. They put music in context in its new contexts and made music as a digital file recognizable and useable for users. Winamp provided an interface that bridged past practices with the new possibilities of digital music and helped sell the idea of music on computers more generally. Metadata added crucial functionality to digital music, making it visible and organizable in new ways. As a result, these technologies and the practices they enabled ignited the development of digital music as a commodity. They made music in its digital form a distinct experience that was substantially different from previous forms of music consumption. They brought enough novelty yet enough familiarity to encourage music's format shift.

Peer to peer file-sharing services like Napster further drove the growth of the digital music commodity. Even though the "free" nature of Napster seemed to negate the very idea that digital music could be a commodity, the software's interface and website brought together a community of users bound by an interest in circulation and connection. Napster built a commodity community that, through its practices of sharing, connecting, circulating, and discussing music, provided evidence that a market for digital music commodities was not only possible, but already existing. Even though Napster never fully capitalized on this community, a host of other companies and services profited from Napster's users and exploited the data generated by its network. Although the record labels frequently blame Napster for sparking the current crisis in recorded music, my dissertation reveals that — along with other vilified technologies of digital music (mp3s, Winamp, etc.) — the software and its users played important roles in defining and commodifying the experience of digital music. Even technologies and user practices that seem to explicitly contradict the logic of commodification can be read as contributions to the shape of the digital music commodity.

After the advent of file sharing, music seemed as if it might not ever be sellable again. Apple's iTunes Music Store was perhaps the most convincing argument that the price function and other attributes of the music commodity had not completely disappeared with digitization. Apple's digital retail music outlet not only brought old forms of presentation and sales into dialogue with new ones, it also combined the act of playing music with the act of shopping for it. Through its integrated technologies, Apple set out a vision for how digital music could be woven into a wider lifestyle of technology consumption. Yet, just as Apple has established dominance in the digital retail market, the music commodity appears on the brink of another shift, moving even further away from its previous iterations. The proliferation of "cloud"-based music services — services that offer to host, stream, store and manage users' music collections for them over the Internet — suggest that music's transectorial integration with computing technologies is far from finished. Music's move to the cloud represents a new kind of relationship between users and their music, one where the sounds and songs of our social lives are increasingly contingent on the control and technology of music service providers. Users' music no longer resides on their computers and they find themselves increasingly distanced from their own collections.

From its earliest stages to its most recent developments, the commodification of digital music files has been part of a wider re-contextualization process, one that has ultimately prepared music for its existence in the digital realm. Music has been digital for several decades now, but this research argues that the story of the digital music commodity is much more recent and much less told. There is a long history of research and philosophy, dating back to Karl Marx (1867) and Adam Smith (1776), on the commodity form and its impact on the production of goods specifically and the negotiation of social life more broadly. There is also a burgeoning field of new media studies that focus on the nature of digital objects and the transition to an increasingly digitized society (Bolter & Grusin, 1999; Gitelman, 2006; Manovich, 2001). This dissertation combines insights from both, asking questions about the digital-ness of the commodity form as well as the commodity-ness of digital objects. With an increasing amount of goods and services moving into digital forms, the arguments that follow provide philosophical insights into the changing nature of the commodity as well as practical tools for how to approach and construct a research object as complex as a digital good.

Through both its content and methodology, this dissertation contributes to literature in communication and technology studies as well as studies of new media and the cultural industries. By teasing out the differences between the commodity aspects of the CD and the digital file, this project offers new perspectives on materiality, aesthetics, labour and ownership in an era of digitization. The interfaces and technologies of digital music represent distinct material and aesthetic mediations of music. This "packaging" contributes to the commodification of music in its digital form. However, rather than a top down process imposed by industry onto unsuspecting consumers, the commodification of music as a digital file reveals itself to be an on-going cultural process that is as dependent on users as it is on industries and institutions. User labour is intimately implicated in the production, reproduction and circulation of the digital music commodity, though the forms this labour takes are not obvious. The commodification process is further complicated by the fact that many of the developments in digital music took place outside of the realms of traditional manufacturing, production and marketing. The digital music commodity is surrounded by a massive legal, technical and cultural grey area, and many of the technologies I studied emerged under the radar of, or at least in blind acknowledgement of, the rules and rule-makers. The stories included here underscore the amount of innovation that takes place in that hazy space where cultural and technological practices have yet to stabilize or get circumscribed by law, regulation, or the normalization of corporate and economic activity. By re-orienting our focus to the commodity aspects of digital music, my research opens up new avenues for critical inquiry in an era of digitization.

Research Questions and Rationale

My research questions stem from an uneasiness about the tone of the discussion of digital music in the media. Unfortunately, much of the debate about digital music devolves into bickering about piracy. The major record labels and industry associations like the Recording Industry Association of America (RIAA) and the International Federation of the Phonographic Institute (IFPI) have traditionally applied the term piracy to large-scale commercial operations that engage in mass copying and manufacturing of popular music on CDs and tapes. In the wake of digitization, they were quick to label individuals involved in online file sharing of copyrighted files as pirates as well. This particular drawing of the battle lines has created a heated rhetorical ground on which arguments about digital music take place (Logie, 2006). You are either for the pirates or you are against them. Controversial developments and legislation like the Digital Millennium Copyright Act (DMCA), the Secure Digital Music Initiative (SDMI), Digital Rights Management (DRM) technologies and the on-going litigation by the RIAA against individual users have further polarized the debate. As a result, discussion at music industry conferences and in the press about music is limited to concerns about how to curb piracy, how to "monetize" digital music files, or how to make digital files more secure through technologies and policies that protect intellectual property by penalizing unwanted behaviours (Boynton, 2004; Dickinson, 2008; Fenton, 2008; IFPI, 2009a, 2010; King, 2001; RIAA, 2010; S. Robinson, 1999; Wunsch-Vincent & Vickery, 2005).

However, piracy and the availability of "free" music is only one factor driving the current shift in the music industries. There are bigger changes taking place with the form and the function of cultural commodities in the current moment. A narrow focus on the legality of file sharing or the quest for new business models means that many of the more interesting questions about the digitization of music remain unanswered. This is not to deny the importance of policy, legislation and economics in shaping the digital music commodity. Rather, I am arguing that a focus on piracy needs to be complemented with a wider discussion about aesthetics, technologies, the creative capacities of artists and industries, and the role of users. At stake more broadly are issues surrounding how we encounter commodities in our culture, and what meaning those commodities have when they assume a digital form. My research questions aim to shift the discussion away from pirates, economic crises and intellectual property crusades towards the process of cultural commodification underlying music's most recent migration. The goal of this project is to explore how various institutions and actors involved in developing technologies and using music contributed to the look, sound, and shape of the digital music commodity. This research is not guided by a desire to figure out what constitutes stealing, how much or how to charge for music, or what file-sharing means for legal conceptions of property. Rather it is motivated by a desire to investigate how music becomes a digital commodity, how this commodity is marketed and presented, and how a dispersed cultural network of institutions and individuals contribute to the process of commodification.

Specifically, my research asks: what conditions existed in which the digital music commodity could emerge? Why does the digital music commodity look the way it does on computers, the Internet and other portable devices? How did the commodification of digital music take place against the backdrop of different (and competing) economic visions for music and the Internet? How do hardware, software and the internal attributes — collectively called the interface — of digital music mediate how music is organized, presented, "packaged" and discovered in digital environments? How does the involvement of users in the creation and reproduction of digital music affect its status as a commodity? Finally, what does the digital music commodity mean for our experiences of music and how we encounter music in our everyday lives?

The current shift in the form of recorded music is not unprecedented. Indelibly linked to its technologies of production, distribution and consumption, recorded — from sheet music to vinyl, cassettes to compact discs — industrial ebbs and flows are relatively common in the realm of recorded music (Chanan, 1995; Eisenberg, 2005; Garofalo, 1999; Tom McCourt & Burkart, 2003, p. 341-342). However, just because it is part of a historical continuum does not mean the current moment has nothing novel to tell us. As Lisa Gitelman (2006) and other new media scholars have argued, "looking into the novelty years, transitional states, and identity crises of different media stands to tell us much, both about the course of media history and about the broad conditions by which media and communication are and have been shaped" (p. 1, see also Marvin, 1988). The last two decades thus provide an opportune moment for a study of the recorded music commodity and the industries that underpin it. Music's most recent migration has been unusually rapid and far-reaching, and its impact on the business of music has been more severe than many previous format shifts. Out of this transition unfold specific insights on the marriage of digital music and digital distribution as well as broader questions about what happens when art, commodities and the infrastructure that supports their circulation collide.

Importantly, the digitization of the music commodity is not just an issue for music. The migration to digital files and online distribution occasions a re-thinking of how culture circulates in current moments and through contemporary spaces. Books, movies, and a number of other cultural goods are currently in the midst of their own digital shifts, posing their own social, aesthetic, economic and political challenges. Manufacturers of these other products are watching the shifting terrain of popular music with anxious eyes (Harmon, 2003; Rich & Lee, 2000). On account of its relatively small size, its ubiquity and its low bandwidth requirements, music was one of the first electronic commodities (other than text documents, and still images) to make its way online and to populate file-sharing networks. Audio content on CDs was already digital, making it easier to copy and transfer than, for example, books. Compared to video, audio required less computer system resources. Thanks to advances in compression techniques, music was ahead of its peers in providing a consistent (or at least recognizable) experience between its digital and non-digital forms. For these and other reasons, music felt the impact of digitization most intensely and immediately after the advent of file sharing.

Now that high quality compression technology has spread to other file types (e.g. films, TV shows, etc.) and the speed and diffusion of broadband Internet connections has increased, the issues facing music have spilled over into other industries (Rich & Lee, 2000; Sandoval, 2009). As media of all kind converge on computers and other portable devices, the codes and conventions that govern the flow of culture are called into question. The case of the recorded music industry may be particularly acute but it signals broader changes across all the cultural industries. Music is prophetic, not just theoretically as Jacques Attali intimated (Attali, 1985, p.

4), but more immediately: what we learn from music's migration to digital formats holds lessons for cultural commodities of all kinds.

This project, then, is a history of new media that combines technology studies, cultural analysis and political economy. It focuses on the impact certain technologies and moments had (and continue to have) on the shape of the digital music commodity as well as on the very idea that digital music could or should be a commodity at all. Before moving on to a description of the specific methodology though, I turn first to explore some of the literature on industrial change, commodification, materiality and new media that provides the foundation on which this research rests.

LITERATURE REVIEW

There is No I in Industry

It is no stretch to say that the biggest innovations in the music industry in the last two decades have come from developments in the field of computing and digital technology. Although recording labels, music retailers and individual artists have evolved in their own right, companies and individuals with diverse interests in technology, computing, and the Internet are the ones primarily responsible for the recent re-arrangement of music's industrial relations. These industries now depend on each other; evolution and innovation in either sector provokes changes for the other. This convergence is not entirely new. There has long been cross-pollination between the music industry and developers of new technologies (e.g. Edison cylinders, Berliner records, Philips and the audiotape, Sony/Philips and the CD), but the migration to digital music is unique in how tightly it has woven multiple industries. Music and computing are now interdependent and conflicted bedfellows.

This industrial mingling exemplifies what Paul Théberge calls "transectorial innovation" (1997, p. 59), a term he borrows from André Piatier (1987/88). Transectorial innovation refers to the increasing interrelationship between once distinct industries (in Théberge's case, this meant the inclusion of microprocessors in an increasing variety of musical instruments). The mixing of diverse sectors results in the creation of converged products and leads to organizational changes within the industries themselves as "each sector has become more and more dependent for its own development on all others" (Piatier 209, qtd. in Théberge, p. 59). For digital music, transectorial innovation has meant that the computing industry is now one of the key developers of new means of finding, playing, storing, and experiencing music, while the music industry owns swaths of content that make computers and other hi-tech products more desirable. As computing and music entwine, they depend on each other not just for technologies and content, but also for people, ideas and practices (Théberge, p. 63). The convergence of multiple media is not just a technical process then; it manifests itself in all facets of production, distribution and consumption (Jenkins, 2006a, p. 3-24).

Transectorial networks complicate the typical view of industries as distinct entities. When headlines shout: "Music Industry Wins Digital Piracy Case", "Difficult Times for the Music Industry" or "Sales Fall Spells Gloom for Music Industry", it is tempting to assume the actors within the industry share a unified perspective (Dickinson, 2008; Fenton, 2008; McBride, 2007). But as convenient as shorthand descriptions like "music industry" or "computer industry" may be, they are a misleading representation of the push and pull of the various groups and ideas that make up such networks (Williamson & Cloonan, 2007, p. 305). The "music industry", for example, is often treated synonymously with the "recording industry", when in reality there are publishers, retailers, advertisers, concert promoters, radio broadcasters, critics, journalists and a host of tangential services that contribute to the circulation and production of music (Williamson & Cloonan, 2007, p. 305). In addition, descriptions of the contemporary music landscape increasingly include computer companies, Internet service providers, online retailers, cell phone content providers, social networks, and an increasingly important army of consumers, bloggers, podcasters and other new media users who take part in the business of music. Given the messiness of these affiliations, Williamson and Cloonan (2007, p. 314) prefer the pluralized "music industries" as an antidote to the idea that industries are somehow distinct entities. They encourage us to explore the tensions that exist in any network made up of multiple actors with competing interests.

Despite the number of businesses now involved in the business of music, much of the music industries' activities are still dominated by the four main multinational companies that control almost 70% to 80% of all global recorded music sales: Warner Music, EMI, Sony/BMG and Vivendi/Universal (Lazich & Burton, 2010a, 2010b; 2005). These companies are "loosely integrated" and "tightly diversified" with the wider entertainment industries (Burkart, 2005, p. 491-493; Burkart & McCourt, 2006, p. 29). Together, they own a vast amount of copyrights and other intellectual property and they exert significant political influence in matters of technology and intellectual property policy through industry associations/lobby groups such as the RIAA and the IFPI (Burkart & McCourt, 2006, p. 28).

Historically, the dominant players in the music industries have shifted in light of new technologies of production and changing social relations (Garofalo, 1999). Music publishing houses, gave way to record companies, which then gave way to transnational entertainment corporations (Garofalo, 1999). But for the better part of the last half-century, the trend has been towards a smaller number of corporations that exert a kind of oligarchic control over the flow of recorded music (Burkart, 2005, 2009). This is not to minimize the impact that digitization has had on the major recording labels, but rather to situate the current situation within the larger history of recorded music. Once worth approximately US $45 billion in 1997 (Hodgson, 2007), recorded music has seen its value cut in half (IFPI, 2010). In addition to stories in the business pages about layoffs and disastrous quarterly reports from the majors labels (Chaffin, 2007; McArthur, 2007), the losses extend down the distribution chain to retail and radio (H. Green, et al., 2005; E. Smith, 2007).

The major record labels blame most of these losses on "piracy" via online file-sharing networks (RIAA, 2010). The reality is likely more complicated (Mann, 2003; Marshall, 2004; Oberholzer-Gee & Strumpf, 2007, 2009; Stein-Sacks, 2006; Zentner, 2006). Some research suggests file sharing actually improves sales, as sampling songs by download increases interest in buying the commodity (Andersen & Frenz, 2007; Oberholzer-Gee & Strumpf, 2007) while other data reveal the opposite (Liebowitz, 2002, 2006; Marshall, 2004). There are studies that correlate the decline in music sales to competitive pressures from video games, cell phones, and an overall increasingly crowded entertainment ecosystem (Stein-Sacks, 2006), and critics who suggest the sagging sales reflect a decline in the quality of the music product offered (Mann, 2003). Despite the tenuous link between file-sharing and lost revenue, dire statistics about the industry's decline are routinely rehearsed to justify constant calls of an industry in crisis. Understood as a transectorial good though, it is clear that music is still being abundantly produced, purchased, and enjoyed. The growth in digital music sales has been notable, up almost 10% from 2008, and digital formats currently account for over 25% of global music sales and almost 50% of U.S. and Canadian sales (IFPI, 2010). A slew of new players have entered the music industries. Ringtones opened up a new market for music (Gopinath, 2005; "New Billboard Hot Ringtones Chart Confirms Mobile's Impact on Music Industry", 2004). ISPs, video game makers, and other content providers are integrating music into their products and offering music to consumers in different places, through different practices and technologies than previously available (e.g. recommendation engines, Internet and satellite radio, online retailers like Amazon, etc.). Understanding the current state of the music industry entails not only appreciating changes in music over the last few decades, but also shifts in adjoining industries. [1]

Piracy aside, the major record labels were clearly either ill-prepared or willfully resistant to changes in the music commodity's format. Journalistic accounts of the transectorial transition — with telling titles like *Sonic Boom* (Alderman, 2001), *Beyond the Charts* (Haring, 2000), *Appetite for Self-Destruction: The Spectacular Crash of the Record Industry in the Digital Age* (Knopper, 2009) and *Ripped: How the Wired Generation Revolutionized Music* (Kot, 2009) — all suggest that the major recording labels were

[1] Despite the gains made in different sectors of the digital music market, in ringtones, and video games there are still doubts on the part of the record labels that the gains in these areas are sustainable or significant enough to offset the losses they have suffered in the sales compact discs (Garrity, 2008; IFPI, 2010; S. Robinson, 1999; E. Smith, 2007; Terdiman, 2009).

unable to adapt to the different landscape computing technology posed for their business. Even some industry veterans readily admit this interpretation:

> There's no one in the record company that's a technologist. That's a misconception writers make all the time, that the record industry missed this. They didn't. They just didn't know what to do. It's like if you were suddenly asked to operate on your dog to remove his kidney. What would you do? (Doug Morris, CEO of Universal Music Group qtd. inMnookin, 2007)

While it is plausible that the record labels simply did not know what to do, many executives also had, in keeping with the above analogy, little interest in even finding an appropriate veterinarian. The labels were so heavily invested in the profitable and controllable economics of CD production that they were resistant to changing models (Burkart & McCourt, 2006, p. 28). Instead, they relied on lawsuits against budding technologies (e.g. Rio/Diamond Multimedia, AudioNet, Napster), intimidation tactics against software developers, "educational"/PR campaigns discrediting digital files as a viable music commodity, and legal and technological initiatives designed to restrict the use of digital music. The labels' collective reaction towards digital music, then, was reaction *against* digital music.

This is fairly standard in media history. Entrenched players in the industry try to preserve the markets they have already learned to control. It has happened before with recorded music (Chanan, 1994, 1995; Coleman, 2003; Garofalo, 1999; Tom McCourt & Burkart, 2003, p. 341-342) and with other media like the videocassette in the 1970s and 80s (Wasser, 2001). New technologies and practices are regularly feared, resisted and then eventually co-opted by the institutions they challenge, often yielding greater profits and control for those institutions in the long run. Despite the cries of a music industry in crisis, there is evidence to suggest the same pattern may slowly be occurring with digital music (Burkart & McCourt, 2006). The shift to digital, while potentially disruptive, has actually served as an impetus for labels to seek out even greater control over the recorded music commodity. Tom McCourt and Patrick Burkart (2006) argue the record labels' cool reaction to digital music is actually part of a stalling tactic designed to give them time to create their own version of the "celestial jukebox" (p. 3). Marketed as a kind of musical nirvana where any text, recording or audiovisual artifact is immediately available to customers through computers, mobile devices, or any other Internet-accessible appliances, the celestial jukebox is really about creating a digital enclosure in which labels control music through digital rights management (DRM) technologies (i.e. those that restrict the ways consumers can access and use music) and consumers through various customer-relationship management (CRM) technologies. "Instead of a gateway into a utopian garden of cultural abundance, the Celestial Jukebox has become a tollbooth into a web of privately owned and operated networks where traffic in intellectual property is carefully monitored and controlled, a walled garden of closed networks with restricted access and tightly circumscribed activities" (Burkart & McCourt 2006, p. 5).

As the development of digital music progresses, these dire predictions about the celestial jukebox are becoming more of a legal and technical reality (Burkart, 2009). That said, the structure and organization of the music industries is more in question now than it has been for a long time. The IFPI, for example, notes that around 95% of all digital music is downloaded without payment to artists (IFPI, 2009a). Other sources suggest that only 1 out of every 20 downloads are paid for (Wilkstrom, 2009, p. 151). Digital music, as a purchasable commodity from e-retailers like iTunes are starting to make up for revenue lost from CD sales, but there are still hives of activity that fall outside what would normally be considered part of the economic core of the music industries (what Burkart and McCourt call the Darknet). There are also a host of new players that are now part of the business of music and they are bringing their own conceptions of music to the discussion. In this light, the shift to digital music may be a potentially liberating moment, industrially speaking. It may open up the possibility for new players from a wide variety of sectors to try new ideas for the promotion, presentation and delivery of music. Whether these new players will emerge as dominant ones or whether established institutions will use their sizeable legal and economic clout to create a controlled celestial jukebox remains undetermined.

The Music Commodity

At its core this dissertation is a study of commodities. It is founded on the belief that our commodities have much to tell us. While it may seem quaint to talk about a music "commodity" in an era where billions of files are swapped instead of sold (IFPI, 2009a), digital music offers us a unique opportunity to re-envision traditional conceptions of the commodity. Like all commodities, the digital music commodity turns us towards issues of labour and economic exchange. How are these things produced, priced and sold? But the digital music commodity also asks us to consider issues of ownership, cultural value, and aesthetics, particularly as they relate to objects that are digital rather than tactile, abundant and infinitely reproducible rather than scarce and limited run. Because of its mobility and plenty, the digital music commodity hovers among multiple states. It waffles between good and service, owned and rented, material and immaterial. It implicates its users in its own production in ways that are different than traditional goods. It is a digital object that gathers value as it circulates, though its circulation often occurs far from the traditional realms of money and value. It is a consumable commodity, and its digital nature integrates that consumption into more and more aspects of everyday life. This dissertation focuses on the commodity aspects of digital music since its commodity-ness offers a unique avenue of analysis for the challenges and issues facing the music industries.

Marx (1867, p. 13) described the commodity as an object outside of us, anything that through its attributes satisfies human wants. Commodities are the products of human labour power turning raw materials into something useful. As useful things begin circulating through society, they gather value through exchange; the worth of an item in relation to other things is its exchange value (Marx, 1867, p. 13-14). For Marx, the act of exchange is an abstraction and the use-value of a given product — the utility of an object — becomes secondary to how much it is worth in exchange (1867, p. 15-16). When we equate and exchange commodities, we equate and abstract the labour that went into them (Marx, 1867, p. 26-33). This results in what Marx called commodity fetishism. Instead of seeing commodities for what they are — a combination of matter and human labour — we ascribe magical and mysterious qualities to them and they become substitutes for the social relations that lie behind their creation (Marx, 1867, p. 42-44). When scores of consumers and journalists welcome new products as saviours — Apple's iPhone was heralded as the Jesus Phone (I. Brown, 2007; Kedrosky, 2007) — it is clear that material and human resources have been thoroughly detached from the meaning of our products. In its extreme form, commodity fetishism extends into all fields of human activity, including consciousness itself and "society [learns] to satisfy all its needs in terms of commodity exchange" (Lukács, 1971, p. 91). The human beings around us become objects, like commodities, and we cease to understand others as active agents of economic activity and historical change.

Commodities are also artifacts of human sociality. They may appear as simple things, but the process of commodification of which they are a result is a complex one, involving temporal, cultural and social factors (Appadurai, 1986, p. 15). Hardly an inert economic object, the commodity is, as Arjun Appadurai (1986) notes, a moment in the broader social life of things: "the social life of any thing [can] be defined as the situation in which its exchangeability (past, present, or future) for some other thing is its socially relevant feature" (p. 13). Commodities are artifacts in a particular situation, the commodity situation (Appadurai, p. 13). They can move in and out of this phase depending on their form, or the contexts that define their exchange (Appadurai, p. 13-16). Value, then, is subjective and not inherent in objects. Commodities take on different values depending who is exchanging them and the context in which that exchange takes place. Think, for example, of the value of a hockey trading card at an auction versus a garage sale, where the expectation of value is different between the participants in each setting. Or think of the value of the same card for someone who is not a fan of the sport. A commodity's economic and cultural worth is prone to change as it moves through various owners and spaces (Straw, 2000). Commodities, like individuals, have cultural biographies (specific circumstances) and social histories (broader histories), both of which affect the way they develop and the meanings they come to inhabit in social and cultural life (Appadurai, p. 17, 34). These biographies are "multiple" — economic, physical, technical and social — and each one has something to tell us about the their role in our culture (Kopytoff, 1986, p. 68).

Recorded music is a particular kind of commodity. Because of the artistic, social, economic, and personal roles it serves, music can be considered a cultural commodity that is distinct from commodities like soap, cereal or shoes (Lacher & Mizerski, 1994; Miege, 1979; Straw, 2002). This is not to say the latter are not, in their own way, cultural, but rather that objectified versions of music, film and books, deserve specialized terminology. As Straw argues, cultural commodities are marked by their fragility: their use value is hard to pin down (i.e. what pleasures do we get from music, how do we describe them, what needs do they fulfill?) and they are characterized by a kind of chronic economic overproduction in which the amount produced vastly exceeds the number that achieve financial success (Straw, 2002, p. 4-7). Cultural commodities are also different in that they are rarely designed for repeated purchase, though they frequently experience repeated consumption (Lacher & Mizerski, 1994, p. 367; Straw, 2002, p. 10). There are many ways to access music without paying for it; listeners buy music when they want to control the temporal aspects of their consumption (Lacher, 1989, p. 368; Lacher & Mizerski, 1994, p. 367). Unlike other commodities that remain a mystery until they are purchased, consumers sample music before they purchase it. This pre-purchase familiarity makes music more like "non- narrative cultural 'texts' — such as decorative objects or easel paintings " than like traditional goods (Straw, 2002, p. 9).

Our experience of music is highly dependent on its commodity character. The recorded music commodity, as Jeremy Wallach (2003) points out, is both sound and artifact and the interplay of these two components is "vitally important in shaping the possible meanings of the commodity" (p. 51). There are surely physiological, neurological and psychological reactions to music worthy of analysis (see for e.g.Levitin, 2006), but these effects/affects depend on how and where we experience music and the format of the music itself: how it looks, feels and plays. It is tempting to associate music's commodity situation with the advent of recording, though even during the times of jongleurs and minstrels in the middle ages, music could be considered a commodity (Attali, 1985, p. 47). The advent of sheet music and modern recording technology simply changed the process of commodification and the end commodities that resulted. Gradually, over the course of the 20th century, the mechanical reproduction of the performance became the central mode of music consumption (Attali, 1985, p. 85; Chanan, 1994, p. 250). Recorded music took on a life of its own. It could be, echoing Theodor Adorno, "possessed as a thing" (Adorno qtd. in Rothenbuhler & Peters, 1997, p. 243). In its commodified form, music's use-value was complicated by a process that added layers of meaning and experience through packaging and marketing. Music came wrapped in a CD, tape or LP. It was surrounded by marketing campaigns, advertisements, and promotions. Even if listeners attended a live show, or listened in on the radio or TV, music came with traces of its commodity status.

The digital music commodity puts a new twist on many of these issues. There is of course human and machine labour that goes into its production (i.e. the writing, recording and formatting of a song), but the costs of its reproduction are significantly reduced. Whereas a rivalrous good like a table or a CD (i.e. if I own and am using it, you can't) gain their value from their singularity, non-rivalrous goods like digital files seem to eschew this logic with their infinite reproducibility. For previous formats of music, and indeed other commodities, the source of much of the commodity's fetish was through its paratextual elements; packaging, advertising and other materials that contributed to the image and meaning of the commodity added to its fetish qualities. Digital commodities are stripped of much of this packaging, and indeed, any kind of context. In the process the fetish logic is called into question or, at the very least, displaced to other aspects of the commodity. Much of the analysis in this dissertation is devoted to tracing this displacement.

The most recent manifestation of the music commodity, the digital music commodity, is a particularly elusive one to map out. This is largely because it was not initially clear that digital music was or even should be a commodity. Rather than a pre-planned industry-sanctioned format change, like the move to compact discs in the 80s, music on computers was more of a by-product of convergences in multimedia computing in the 80s and 90s. Stripped of much of their context and content, the digital versions of music recordings lacked much of the information, materiality and "thingness" that contributed to much of music's commodity character. Music files on the computer seemed to be just another function that computers provided rather than a potential new market or social artifact. Furthermore, the nature of the digital music commodity and its associated technologies implicates users in its own reproduction and circulation more so than previous formats. Users are co-creators of a kind of user-generated commodity. While other formats of recorded music have facilitated sharing and user-driven production (e.g. piano rolls, tapes, CDs), the development of the digital music commodity depends heavily on the intentional and unintended labour of its users. It owes as much of its shape to the technologists, entrepreneurs, and users who embedded it with certain information, functionality, and aesthetics as it does to the companies in charge of marketing and distributing it.

Digital music is a special kind of commodity then; a liminal case that draws on previous conventions of the commodity and one that offers new insights about the objects that circulate around us, digital or otherwise. As research objects, commodities set aside traditional academic divisions between producers and consumers, between the economic and the cultural. To look at the commodity solely through the eyes of a political economist or marketer or cultural theorist is to miss much of what it has to say. Commodities are industrial products but designed specifically with consumption in mind. One can read in the commodity the effort and scars left by the labour, energy and resources that went into its creation. Once packaged, the commodity's form and appearance hint at what's expected of it: where it might travel, to whom it should appeal, where it could be sold and how much it might cost. When commodity and consumer finally meet, the object takes on new meanings and dimensions thanks to this encounter. The commodity's very presence sparks questions about its origins, its composition and its appeal. As things of our own making, their uses and meanings reflect our cultural secrets back to us. Commodities are markers of time and history or, as Michael Taussig (1993) notes, "the petrified historical event where nature passed into culture, where raw material combined with human labour and technology to satisfy cultured design" (p. 233). In the commodity, the abstract and the concrete coalesce. As objects that circulate and persist, commodities are "extra-somatic memory: memory held outside the body" that tell us something, culturally, about what we've valued and forgotten (Straw, 1998, p. 1). Commodities are not just signs or symbols, but an "economy of meaning and practices of expenditure in which an object, be it a commodity or a fetish, spills over its referent and suffuses its component parts with an ineffable radiance" (Taussig, 1993, p. 233). The digital music commodity has these things to tell us, and more. Within its data and code, it holds insights about music as a cultural form and lessons for all kinds of commodities that are currently undergoing digitization.

Digital Materiality and the Commodity Form

Digitization alters the materiality of the music commodity. Most disconcertingly for those involved in producing and selling recorded music, the materials that give shape and context to the music commodity fall by the wayside as music migrates to its digital form. In other words, music loses the things that make it a sellable thing. Physical commodities have a tangible materiality that helps define their use and exchange value. The CD's packaging, contents, artwork and liner notes all serve to fix the music commodity in a desirable objectified form. Maria Styvén (2007) argues that the intangibility of digital music makes it difficult to display, increases uncertainty and risk in the buying process, leads to confusion over ownership and patents, and complicates pricing issues (p. 57-60). Without something to hold, consumers undertake a different value equation when deciding whether to purchase (or otherwise acquire) digital music. For some, dematerialization also influences our experience with music. Noting the gradual reduction in the visual and tactile aspects of music recordings from records, to tapes to CDs to the minimalist digital file, McCourt (McCourt, 2005) argues that "fluidity, rather than integrity, is the defining characteristic of digital technology" (p. 249-251). In other words, the functionality of the digital commodity takes precedence over its form and music suffers as a result. Music as a digital file "lacks potential emotive contexts" and is "emotionally less valuable" than a physical artifact (McCourt, p. 250).

While I agree with McCourt's overall argument that the experience of music in its digital form differs from that provided by previous formats, the link between music's materiality and its value seems like a relic from of an era that locates the aura of an object in the physical expression of the artifact (rather than in the interplay between the content and its materials).[2] Even if digital music brings with it different conditions of value, the digital music commodity is not as intangible as Styvén and others suggest (McCourt, 2005; Rothenbuhler & Peters, 1997). Digital files still take up space: folders filled with mp3s or other formats eat up hard drive space, and the windows of the jukebox occupy limited screen real estate. Like other programs, media players use up a computer's resources, adding real demands on the overall performance of the system. Mice need clicking, servers and hard disks need filling, and credit card statements need paying. Listeners still need to touch the music (even if it is with a cursor) in order to play or stop or rewind it. Users may not be flipping through album covers or poring over album liners but they are still touching, looking, and sorting. It is not that digital music is immaterial or intangible. Rather, it is experiencing what Jonathan Sterne (2006) refers to as "micromaterilization" (p. 831-832). Despite being very minute, music's micromaterials still mediate interaction with the commodity (i.e. its look, its sound, its data, the way it is sorted and played

[2] See for e.g. Plato's Phaedrus (360 B.C.E.), Benjamin's (1969) notion that the "aura" of a work of art withers in light of mechanical reproduction, Adorno's (1938, p. 38) worries that rationalized reproduction of cultural goods creates a standardized commodity shorn of its "ethereal and sublime" characteristics, or Attali's (1985, p. 87) claim that mass repetition through technological reproduction, destroys the force of music and serves as a means of social control.

back, etc.). The materiality of the digital music commodity is re-imagined through its interfaces, metadata and peripheral devices. Just as music on plastic or vinyl required certain materials for distribution, dissemination and playback so too do the material aspects, associations and technologies of digital music affect how it looks, feels, collects and circulates in our culture (Bodker, 2004). The result is a distinct commodity experience.

Instead of simply equating the digital with the immaterial and intangible, this dissertation focuses instead on what Matthew Kirschenbaum and Richard Ovenden might call "the digital materiality of digital culture" (Ovenden qtd. inKirschenbaum, et al., 2009, p. 110). Even though Kirschenbaum's research focuses on "first generation electronic objects" — objects that enjoy "no material existence outside of the electronic environment of a computational file system" — he is quick to note that "born digital" objects still enjoy a material existence within an electronic environment, and that first generation electronic objects "sometimes enter into very intimate relationships with physical artifacts" (Kirschenbaum, 2002, p. 20). In other words, data and the interfaces through which we sort, organize and view them are unique instances of material expressions, regardless of how digital they appear (Kirschenbaum, et al., 2009). Or, in the words of MacKenzie Wark (2006):

> Information is never immaterial. Information cannot not be embodied. It has no existence outside of the material. It is not an ideal or a ghost or a spirit. (Although it may give rise to these as mystifications . . .) And yet, information's relation to the material is radically contingent. […] The coming of the digital is the realization, in every sense of the word, of the arbitrary relation between information and its materiality, of which the arbitrary relation of signifier to signified is but a special case. (p. 173)

The materials of digital music may be more customizable, more arbitrary than the materials of previous music commodities, but they still exert an influence over the expression and representation of music.

The tendency to treat digital files as immaterial is partly why digital music has received little attention, as a commodity. However, as the following research argues, the fetish qualities and exchange values of music still hold tremendous weight in the digital age, despite digital goods' apparent lack of physical weight or dimensions. On the one hand, this should not be surprising. It has long been understood that a commodities gain their value not just from the materials that make them up, but from their exchange, from their circulation in relation to a whole world of commodities and labour. The wonder and mystique of the commodity fetish is precisely that it is not located in the object itself. It is something created around the object. On the other hand, the apparent lack of value and worth of something as micromaterial as a digital file make these relations difficult to see and analyze. The fetish and pull of the commodity is still very much existent, even if its object-ness has been drastically altered via digitization.

Contrary to claims that digital goods are intangible or immaterial then, the digital music commodity has multiple materialities to explore. These can be broadly lumped together as digital music's "packaging". As with other commodities (Willis, 1991), this packaging sets the context through which we interact with digital music commodity. The cases that follow focus on the interfaces, metadata and other software and hardware of music playback because these have been primarily responsible for re-creating and (in some cases) re-imagining the form and function of music's packaging in its digital form. Digital music's packaging and presentation raises questions as to how music appears to consumers, how companies replicate and circulate the material attributes of digital products, and what value consumers ascribe to products that largely exist as digital data on servers and hard drives. It is highly responsible for much of the fetish qualities that exist with the digital music commodity. Hardly immaterial, as Henrik Bodker (2004) suggests, "music as a cultural form has not become disembodied but rather woven into and out of an additional range of devices and appliances" (p. 3).

The interfaces of digital music software and devices are particularly important parts of this packaging. They are the moment where user and medium meet. Recent studies of new media all highlight the ways in which interfaces mediate our experience of digital goods and culture (Bolter & Grusin, 1999; Gitelman, 2006; Manovich, 2001). These authors argue that new media are new by virtue of the way they reconfigure previous media conventions to create something unique and novel (Bolter & Grusin, 1999, p. 15). Interfaces simultaneously reveal remnants of previous technologies and visions of the future (Grusin, 2004). As they remind users of old practices and introduce them to newer ones, interfaces help explain how we got to where we are going. Packaging and marketing, broadly put, thus play crucial roles in the assimilation of new technologies and practices. The cultural interfaces that structure our relationship with digital music present users with different ways of conceiving of music and musical experiences. They help make the idea of digital music understandable to those involved in its circulation and use. The screen, the mouse, the window, the gadget; these are the interfaces through which we access digital music. Their features, their evolution, and what they make available or unthinkable are just as much parts of the digital music commodity as its price or the conditions of its production.

The Digital Economy

Of course, music did not experience digitization alone; it is not the only object whose price and commodity character came into question. The digitization of music was part of a wider migration of commodities into digital formats, commodities that subsequently made the Internet part of their distribution and consumption paths. As the digital music commodity evolved, it started participating in a broader field of digital goods, a "digital economy" that was at once separate from, yet entangled with, the traditional economy of physical goods. This dissertation is both sensitive to yet critical of the idea of a digital economy. After all, are digital goods so different and dissociated from the world of physical artifacts that a digital economy might offer a re-conceptualization of how commodities are produced, distributed and consumed? If so, what codes and conventions govern the transactions that occur in this space?

For scholars like Richard Barbrook (1998, 2002), the digital economy opened up an alternative to traditional capitalism. Since the Internet began as a military and academic effort, outside of the realm of commercial services, he argues that many of the Internet's most "iconic technologies" came from the collaboration of a community of DIY enthusiasts rather than from the exchange of money (Barbrook, 1996, p. 56). It was a non-commercial space, at least initially. In this environment, vibrant sharing-based gift economies and other forms of digital exchange emerged and gave the Internet and the digital goods that circulated within it much of their initial social value (Barbrook, 1998). For Barbrook (1998), file-sharers and other users pushing for the free flow of information were engaging in radical acts of civil disobedience and gift-giving, practices that could eventually lead to a more widespread "hi-tech gift economy" fuelled by the Internet's distributed and de-centralized infrastructure. In his view, the gift was "the absolute antithesis of the commodity" and communities that rely on them as their primary source of exchange were evidence of "really existing anarcho-communism" (Barbrook, 1998).

Barbrook's notion of gifts and their role in the digital economy is not without its problems though (Leyshon, 2003, p. 554). Admittedly, Barbrook (1996) recognized that toward the end of the last century, digital capitalists who valued commercial services (e.g. the privatization of formerly shareware software, the subscription fees placed on formerly open communities) over sharing and gift-based economies were increasingly driving the services, sites and software on the Internet. However, it may not have been evident to him at the time how, for many digital entrepreneurs, online gift economies are not so much an alternative economic practice as they the foundation of a new type of business model, a kind of capitalism re-invented. This is evident in the work of writers like Chris Anderson (2006, 2009), who see the Internet as a friction free environment where the market works unhindered, where buyers and sellers connect directly, and where consumer choice is unprecedented (see also Bakos, 1997). "Free" stuff (i.e. gifts) is what draws consumers in and leads them to other commodities. Anderson's argument rests on the idea that since users are able to find swathes of goods for free somewhere online, companies need to start regularly incorporating free offerings into their business model. Hardly radical acts of protest against capitalism, "gifts" can quite happily contribute to a company's bottom line (Anderson, 2009). Gifts (either free stuff or free labour by willing users) are potential carrots to get users to participate in the digital economy. They are not examples of anarchy; they are tools through which new business models will be built.

Tiziana Terranova's (2004) perspective on the digital economy helps explain this seeming contradiction between gifts as a disruptive model of distribution and gifts as a radical new kind of capitalism. She argues that talk of a "digital economy" leads to assumptions that the Internet somehow operates according to its own principles, grounded solely within its own spaces and technologies (Terranova, 2004, p. 75). Terranova encourages us not to forget the "outernet - the network of social, cultural, and economic relationships that criss-crosses and exceeds the Internet" (p. 75). Her logic counterbalances Barbrook's optimism about gift communities and helps explain Anderson's belief that free stuff (labour or goods) can be easily re-positioned within existing commercial practices. Since gift economies are "part of a larger informational economy" they are actually an "important force within the reproduction of the labour force in late capitalism as a whole" (Terranova, 2004, p. 77). Free "stuff" can be part of both gift economies and regular commercial exchange. The practice of giving is not necessarily radical; it can also be a "fundamental moment in the creation of value in the economy at large – beyond the digital economy of the Internet" (Terranova, 2004, p. 77). Both Barbrook's notion of gift economies and Anderson's idea of Free take on a kind of frontier ethos that conceives of the Internet as an empty space in which an economy could be built or grown. However, new markets, technologies and ideas only ever emerge in relation to existing commercial and social practices. The digital economy is incapable of being its own separate sphere, despite how different digital goods appear to act. On the Internet, digital goods are always circulating in relation to the outernet.

This is particularly important for the digital music commodity. Millions of digital music files move across hundreds of networks every hour. Some of this movement is part of the regular, sanctioned market economy where files are bought and sold in online outlets and revenues divided among the various rights-holders. Much of it is not. Digital music is widely circulated in alternative economies, be those some idealized version of a "gift" economy or other forms of exchange. The result is that, as Sterne (forthcoming, 2012) notes about the mp3 file, digital music "partakes of both commodity form and something else" and occupies "an ambiguous position that is both inside and outside market economies" (p. 384, 400). Exchanges involving the buying and selling of digital music represent only a fraction of its total circulation, but even still, the commodity form persists and mediates users' encounters with music (Sterne, forthcoming, 2012, p. 387). As Sterne points out, even if users have not paid directly for files they download, they still feel and act as if they "own" them (p. 385). Users are heavily invested in their digital music though that investment is only sometimes the result of a financial transaction. This ownership, I argue, is partly due to the pull of the commodity form. Price is hardly the defining characteristic of a commodity and one of the driving tasks of this research is to outline the other attributes that make digital files commodities. The interfaces, metadata and micromaterials that make up music's commodity form contribute to its object-ness and to users' sense of propriety over it. Even in its freest of forms, digital music can be packaged, treated, and made to act like a commodity.

METHODOLOGY: MOMENT THEORY

My approach to this research is motivated by the belief that the study of media artifacts and commodities leaves us with measurable reflections of our everyday practices. I am particularly interested in the collision of cultural and industrial activities and the intersection of new technologies and ways of experiencing culture. My approach involves a combination of theories and methods from new media studies with political economic analyses of commodities, media and the music industries. It also consists of a methodology that I refer to as *application analysis*: a specific type of case study that offers methodological advances for researchers interested in studying digital objects.

One of the challenges, and ultimately, contributions of this project is the framing of the research object as a piece of new media history. The digital music commodity is constantly emerging, so tracing its evolution has been a slippery task. Events, technologies and ideas that once seemed critical faded quickly (e.g. DRM on the iTunes store), while smaller, sometimes insignificant details emerged as primary attributes of the digital music commodity (e.g. a Winamp plug-in that helped the jukebox read CDs). Something so historically close makes it difficult to do a traditional history; there are no grand narratives to rely on or refute. To cope with such a rapidly morphing new media research object, the chapters here each present a series of moments during the transition from music on CDs to music as a digital file. Moments are fluid enough to account for constant change, yet they also serve to fix certain ideas, technologies and practices within an observable, researchable context.

In this research, these moments take the form of case studies (Stake, 1994; Yin, 1989). Like the cases in Gitleman's *Always Already New*, they focus on events:

that "most condensed and semantically wealthy unit of time" (Doane qtd. in Gitelman, 2006: 138). The individual cases here highlight five key technological developments (Winamp, the CD Database, Napster, the iTunes Music Store, Music in the Cloud), but they also internalize the circumstances in which those innovations occurred. Similar in some ways to what cultural studies scholars call conjunctural analysis (Grossberg, 2006), the moments in this dissertation provide insights into specific developments that are culturally and historically situated while simultaneously commenting on the broader currents that underlie their evolution. Case studies are an ideal strategy for this kind of inquiry since they investigate "a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident" (Yin, 1989, p. 23).

I selected the particular moments or cases in this dissertation based on how keenly they highlighted telling configurations of aesthetics, technologies, users and artists. The case of Winamp, for example, is more than just a case about the origins, features and impacts of a piece of music playback software. It is equally concerned with the decade preceding the arrival of Winamp and the push towards making computers "multimedia" machines. Without understanding the computer industries' broader vision for personal computing, and the music industries' inability to develop a popular interface for music on the computer, Winamp appears as simply an isolated technology; one of many in the history of the emergence of the digital music commodity. As part of a larger moment though, it is clear that Winamp depends on a whole series of cultural and technical preparations. Moment theory helps set the context for how to approach a specific case. Similarly, the moment surrounding the iTunes store includes a detailed analysis of earlier online retail attempts and a meditation on the ideas of ownership and value that set the context for the store's emergence. The cases of the CD database and ID3 tags would be incomplete without a broader discussion of the role information has played historically in shaping how consumers use, experience and think about the music commodity.

Another criterion for including these specific technologies and excluding others depended on how deeply they embedded themselves into the infrastructure of digital music. Sometimes it was purely a quantitative argument: Napster and the iTunes store both gathered substantial numbers of users and this in itself merits discussion. Other cases relied on more of a qualitative assessment. ID3 tags and the CDDB do not exactly have a measurable number of users, but they are part of the fabric of the everyday transactions and circulation that occurs with digital music files. All the cases – with perhaps the exception of music in the cloud, which looks forward to future developments – have all had and continue to have a demonstrable impact on the shape of the music commodity. There were certainly other technologies and moments that could have been considered (e.g. the advent of RealPlayer and streaming audio, mp3.com – the first online mp3 store etc.), but many of these were dismissed because their impact was limited to a small group of users, or because their direct effects on the shape of the digital music commodity seemed less discernible. File sharing did not begin with Napster. However, the program was the first to present music and connect users in a way that significantly altered the future of the distribution of digital music. The CDDB and ID3 tags are not music's only metadata technologies, but they are the most embedded into the digital music commodity and they most clearly display the value and labour that users put into digital music.

There were also moments beyond software that could have been considered, such as the formation of the SDMI, the enactment of different legislation governing digital music, or the development of broadband infrastructure and high speed Internet connections, but focusing on a piece of technology for each case provided a platform for a consistent analysis across all cases (again, with possible exception of the final case, which looks at multiple cloud music services rather than one specific interface). Obviously legislation like the DMCA has conditioned what is and is not possible with digital music, but so much of the music commodity's key features continued to develop even in light of the regulations. As such, it was more important to focus on the surfaces and interfaces that present the digital music commodity.

Application analysis makes software and its influence on cultural commodities the guiding concern of this research. This is not to suggest that stories about the creators, users, fans, and communities of these technologies are unimportant or even ignored in the following pages. However, rather than read developers, users, artists or executives from a traditional ethnography or from interviews, I read them *through* the interfaces of the software and through the ways in which the features of the technologies position them. Although fan studies (Jenkins, 2006b) or other user-centric approaches (Baym, 2010, DeNora, 2000) offer useful perspectives for describing changes in the experience of music in the contemporary moment, my project makes the application the primary focus, and offers a picture of creators and users that is complementary to those kinds of research. Application analysis still studies users, creators, fans, musicians and industry executives, but it does so while remaining grounded in a rigorous analysis of artifacts, applications and interfaces. As such, the moments considered here focuses on the articulations (Hall

& Grossberg, 1986) that arise between technology and music, and the various actors this interaction brings together.

It should be noted that although the digitization of music and Internet file sharing are relatively widespread phenomena, most of the technologies studied here originated in the United States, and in the state of California in particular. Not only do specific geographic and socioeconomic conditions frame the technologies themselves; the wider discussion of the digital music commodity is inextricably linked to how music is perceived and used in North American (or at least Western) contexts. There are, for example, other countries, regions or spaces where music's commodity status may not be as fully entrenched, or where there exist wholly different ideas about exchange, consumption and the circulation of music. Additionally, access to the Internet and computers also varies highly by region, so some of the findings may have limited applicability outside North America. In some areas, for example, mobile phones are much more prevalent than computers as a means for going online, and the entire online experience is conditioned by slower speeds, antiquated technologies, government regulations or spotty connections. The experience of digital music in these contexts is not wholly accounted for in the following research. That being said, the theories and methods I outline still offer a template for approaching the applications and interfaces of music of all kinds, even if the technologies in question may be vastly different than those considered here. Also, the framing of the digital music object *as a commodity* provides unique line of inquiry for studying the changes brought by digitization. Even though music may be more or less commodified in certain cultures, the attributes that contribute to its commodity-ness are still relevant and ripe for analysis.

Another methodological contribution this dissertation makes concerns the kind of evidence and information used to construct the research object. Unlike many historical objects, there is no traditional archive or unified database of sources to explore for digital music. Since the digital music commodity is hardly fully formed, the research object itself still takes shape every time a new service or technology incorporates music into its offerings. As a result, I have had to pull from a wide range of sources and types of analysis in order to sketch its contours. Fortunately, case studies excel in instances "in which multiple sources of evidence are used" (Yin, 1989, p. 23). All the cases (except for the final one) start from a critical interpretative reading of the "interface" for the application or technology in question. Drawing from new media scholars like Jay David Bolter and Richard Grusin (1999), Lev Manovich (2001), Lisa Gitleman (2006), and Ross Horsley and David Gauntlett (2004) this type of analysis highlights the codes and conventions that are inscribed in the technology and the impact on the commodities that pass through them. I am particularly concerned with the design of cultural interfaces (Manovich, 2001, p. 69) and how they represent the aesthetic and functional features of the digital music commodity. I carry out a detailed description of the software features of Winamp, iTunes and Napster and use this as the base to make arguments about how the program works, how it makes music appear, and how it guides users through the experience of playing music on the computer. Where possible, I have located and used many of the older versions of the software in question. Through ported programs, change logs and software gallery sites like Really Rare Wares (http://web.archive.org/web/20071021031644/http://www.rjamorim.com/rrw/) or the Graphical User Interface gallery (http://www.guidebookgallery.org/) I track the changes that occur to the programs and their interfaces as they develop. I conduct a similar analysis for the CDDB and ID3 tags, though I focus more on the structure of the database and the categories of metadata they encourage, since their "interface" is not really located in one specific application. The final case, focused as it is on a relatively new trend in digital music, discusses multiple cloud music services at the expense of providing a detailed reading of one interface in particular.

Four of the five cases also make heavy use of historical website research. Applications like Napster and Winamp depended heavily on the links between the software and those companies' main websites. Using the Internet Archive's "wayback machine" – a search engine that provides snapshots of websites over time – I trace how companies behind the technologies in question presented themselves and their software and analyze the way they packaged, presented and talked about the digital music commodity. For the case of Winamp and Napster, the wayback machine offered access to the companies' websites during the early stages of their emergence (approximately 1997 to 1999). Screenshots taken at monthly intervals (or whenever the sites were updated) provided an archive of images and text to complement the descriptive analyses detailed above. The wayback machine was also useful in following the evolution of ID3.com and the CDDB and some of the companies involved in its commercialization. The iTunes store does not have its own "website" since the store is integrated into the software. However, I still made use of the wayback machine to analyze software on which iTunes is based (SoundJam Pro) and to follow the development of iTunes on Apple's main website (Apple.com).

As a research tool, the wayback machine is not without its quirks (Murphy, et al., 2007). Screenshots of websites are often incomplete or unavailable, some of the archive's data are inaccurate, past data can be modified from the present, and many websites are not tracked by its search robots (Garfinkel & Cox, 2009, p. 2-3). Still the fractal glimpses the archive does provide are some of the only records of how companies marketed themselves and their new technologies online. They provide a useful narrative about how certain innovations emerged and evolved, one that makes visible the different materialities and interfaces that shaped the emergence of digital music on computers.

All the cases also involve media analysis. Following Théberge's (1997) example, I have stitched together an "archive" of tech magazines, trade publications, press releases, software reviews and general news sources to parse the press discourse surrounding the introduction, adoption and proliferation of the technologies in question. This includes industrial and popular literature and probes both technical (i.e. what does this new technology do?) and cultural (i.e. what do we do with this new technology?) aspects of the introduction of new media. Where possible, I have also included sources written by the creators of the technologies in question. For example, the chapter on Winamp includes an interpretive analysis of the book *MP3 Power With Winamp* by Justin Frankel, the software designer behind the program. The chapter on the iTunes store incorporates material written by Steve Jobs as other Internet retail entrepreneurs. I pay special attention to press releases from the companies in question. By juxtaposing these releases with reviews of the products and other tech press articles, it is possible to get a sense of the marketing strategies and the expectations that accompanied these technologies as well as an idea of how they were received and how their meanings and uses negotiated.

All the specific analyses are supplemented by insights from media and communications theory. Rather than providing a lengthy review of all the relevant literature and theory in the first chapter and then applying it to all the proceeding cases, I have tried, where possible, to let the theory arise from the peculiarities of the research object in question. For these reasons, each chapter introduces relevant theoretical ideas as it unfolds. The theory builds as the analysis takes place. The result is a range of sources and techniques for research that involves what I have been referring to as application analysis. It is a specific use of case study methodology that puts software applications and the moment that surrounds them on center stage. It is medium agnostic and widely eclectic in its use of sources. It is ideally suited to objects that are only recently historical and that continue to take shape as the research unfolds. It follows the bridges between old software interfaces and new behaviours. It mines dead links and press releases for obsolete technologies to seek out discourses that governed the launch and diffusion of services and devices.

Chapter Outlines

Chapter one describes the case of Winamp, a piece of computer software widely regarded as one of the first mainstream "jukebox" players for listening to digital music on computers. The culmination of years of convergence in the music and computing sectors, Winamp was a cultural interface that introduced computer users to how music looked and sounded on the computer. The chapter begins with a brief history of the multimedia "revolution" of the late 1980s and early 1990s, and explores how music was bound up in a drive to make computers devices of personal expression and liberation. The chapter then proceeds with a critical review of press and marketing discourse surrounding the software and an investigation of the political economic development of Winamp as a company. By reviewing the software's key features, the chapter argues that Winamp was a crucial bridge between previous and newer ways of accessing, organizing and understanding music. While Winamp, as a company and a piece of software, may have hoped to liberate music from the confines of its commodity status, it was also a zero moment for the beginning stages of the commodification of digital music.

The second chapter focuses on the Compact Disc Database (CDDB) and ID3 tags, two of the primary technologies for music metadata — the data about music files that help users and software identify and sort music. The CDDB is technology that reads the data on CDs in computers and presents the information back to users and software programs in a useable and familiar way. ID3 tags are an extension to the mp3 format that allows users to append information to digital files, again making them useable and organizable. Together, these technologies embed digital music with much of the required information for handling and understanding music outside the context of its traditional paratexts. Both technologies were side projects of hobbyists but they developed into crucial resources for digital music, in large part thanks to the work of scores of enthusiastic Internet users. Through a close reading of the emergence of the CDDB, ID3 tags and their most significant features, this chapter argues that metadata are central technologies for ordering and organizing the digital music commodity. The information metadata provide, and the functionality they allow, give shape and context to the digital music commodity. They form part of the information backbone of the digital music industry, with repercussions for privacy, surveillance and the role of digital databases. Metadata have also evolved into important cybernetic commodities in and of themselves. That said, the CDDB's and ID3's user-generated origins complicate how we understand commodification. Metadata implicate users in the commodity creation process and focus our attention on what might be called user-generated commodities.

Chapter three retells the oft-told tale of Napster, this time turning a critical eye to a key oversight in most discussions of the file-sharing service: despite all its disruptive potential, Napster was, at its core, a business that sought to develop and eventually commodify an audience. I put in dialogue academic and journalistic discourses about Napster with traditional and emerging political economic theories about the role of media audiences. I argue that Napster planned and cultivated the creation of a commodity community, a unified group of users that provided benefits not just to Napster but also to a host of companies that sought to mine value from the activity taking place on the file-sharing service's networks. Napster's website as well as the software's interface and key features reveal a commitment to building a particular kind of community, one that could be both politically and economically valuable. Napster's most lasting impact was not the fact that it opened up the Pandora's box of file sharing. Rather, it was the audience the software gathered. The uses to which this community put the program emphasized the mobile and circulatory aspects of digital music while highlighting the importance of networked connections in the digital realm.

The fourth chapter details the rise of the most successful online music retail outlet to date: the iTunes Music Store. Using the launch event for the store, subsequent press coverage, and a discussion of the store's interface and navigational features as sources, the chapter explores how the presentation of music in the iTunes store affects our conception of music in its digital form. The store draws on many of the traditional practices of seeking, sorting and selling music in its attempts to re-inject value that had seeped out of the music commodity. Taking cues from Napster and the CDDB, it also makes use of user-generated content in order to increase the use and exchange value of the digital music commodity. Moreover, the store is networked in such a way that consuming music through the iTunes store requires users to interact with a whole series of technologies. The iTunes store combines the act of playing music with the act of shopping and buying it. Rather than simply trying to sell music as a digital file, Apple has actually sought to commodify a kind of digital music lifestyle wherein the entire experience of finding, accessing and using music in its digital form is subject to commodification.

The final chapter examines a recent trend in the development of digital music: the push toward music in the "cloud". Part metaphor, part vision for the future of music, the cloud analogy conceals as much as it reveals. The cloud is a diffuse and indeterminate space to which a slew of technologies, business, social networks, and mobile media connect. Music in the cloud is not just a commodity but the background noise for a series of networked interactions and digital initiatives. The cloud opens up new opportunities for music, but it also makes music contingent and subject to the whims of the music service providers that control and manage access to the digital music commodity. Music becomes a complement, and in the process, the rights of users and musicians are often ignored or overlooked. When music resides out there, in the cloud, and not under the immediate control of the user's computer, it gets subsumed in a more complex technical relationship. This has implications for how we collect the digital music commodity and how we sift through the meaning, history, and traces our music collections create.

It is too early to tell how disruptive the Internet, file sharing, and the digital commodity will be relative to other transitions in the history of recorded music. The form and character of the music commodity are currently in flux and, as with previous format changes and innovations, there is hope this instability might re-organize the economics and/or power structure of the music industries. However, for every beacon that change is afoot, there are equal reminders that complete disruption is unlikely, or at least overrated. Models for the retail of digital goods seem strikingly similar to their analog precedents and digitization has provided numerous opportunities for new forms control and power (e.g. surveillance, data mining, advertising) that limit rather than enhance the rights of users and musicians.

That said, the digital music commodity does promise to turn our attention back towards the value and meaning of the music commodity and other objects that circulate in our social lives. A host of musicians, labels, entrepreneurs and everyday users are engaging in experiments that put into question the conventions about how to present, use or sell a particular digital song, album, or playback technology. These experiments force a reconsideration of the role of music in the contemporary moment and the worth we ascribe to digital goods. While the rise of the digital music commodity is clearly a technological story, the migration of music on CDs to music as a digital file is not simply about making sure an old commodity is compatible with new technologies. It is a cultural process of adaptation that leaves us not just with new formats and devices, but also with new ways storing, sorting, finding, buying and experiencing music. In a world where millions of digital songs are produced each year, each one is a statement about the contours of the digital music commodity. Each one is evidence that the selling of the idea of digital music is still underway.

Chapter 1 - Music as a Digital File

Old Timers

> I came along around [Winamp version] 2.03 when mp3 didn't mean anything. It was a time when if we wanted a copy of a song, we would rip WAV straight from the CD-ROM. And then a friend of mine introduced mp3 and Winamp to me and I downloaded it. I loved it ever since [*sic*]. (Jstalilwyrd, 2001)

> I've been using Winamp since v1.00 hit the scene. I think it was around May 1997. My first MP3s were encoded with L3ENC at 56 kbps, and I was proud. I turned on Creative WaveStudio and click Record, then I played the song I wanted to 'rip' [*sic*]. (Nexxus, 2001)

> I remember the orinigal fraunhoffer l3enc. I remeber waiting 1/2 hour to encode an mp3. I remeber not being able to play a 128 kps mp3 because my computer wasn't fast enough (I miss my 486). Those were good times [*sic*]. (D-cibeL, 2001)

> ive used winamp since around 1.x i dont really remember. damn that was a long time ago […] im only 15, but i feel so old [*sic*]. (s1138, 2001)

Winamp was one of the first widely used programs for playing digital recorded music files on computers. The comments above come from posts made to the user forums on the Winamp website. Specifically, they come from a discussion thread called "Old Timers", initiated in 2001 by a user named Nexxus. The thread, Nexxus hoped, would be a venue for users who remembered the "early days" of digital music to share their experiences. Put aside for a moment the specific technologies they mention (i.e. L3enc, WAV files, CreativeWave Studio, etc.). You may be more or less familiar with them, and for now, that matters little. Consider instead the *moment* these users are describing: their first memories of recorded music on the computer. At first glance, their back-and-forth hardly seems like a very musical discussion, concerned as it is with encoding software and processor speeds. Underneath this high-tech talk, however, these "old-timers" are also bonding over fond memories of early digital audio and revealing the joy that came with preparing and playing music on their computers. One user, even half-jokingly admits to getting "tearfully nostalgic" reading through the thread (Dellis, 2001).

The techno-musical yet highly affective nature of their posts provides a fitting outline for the two main themes of this chapter. First, their discussion underscores the significant convergence that has taken place in the music and computing industries; a union that has defined the production, circulation and consumption of recorded music for the better part of the last two decades and one that continues to have implications for how we access and experience music. This transition has been rapid and profound. Although these "old timers" seem to be waxing nostalgic about a far-off time, they are mostly teenagers and the technologies they long for are merely a handful of years old. The history of digital music on personal computers was barely in its opening chapters, yet here was a group of users trying to ensure the memory of digital music's beginnings did not fade away. Second, their collective stroll down memory lane speaks to the important role various pieces of software, hardware and cultural practices played in readying music for its life in digital contexts. The affective relationship these users had with Winamp and other early computer audio technologies that mediated their initial experiences with music on the computer suggests this was more than just new gear for accessing music. The in-depth details about encoding files or the demands digital audio placed on their systems reinforce the devotion these users had for making music playable in a new environment. Their attachment to the work they carried out and to the technologies they used in the process are emblematic of a wider relationship that was beginning to form between users and music in its digital form, as aesthetic object and as commodity.

Following these two general ideas, this chapter begins by briefly reviewing some of the developments in the late 80s and early 90s that shepherded popular recorded music on to the computer. Winamp could not have existed without (at least) a decade long effort on the part of computer manufacturers to create a multimedia machine that could handle the demands of digital audio. It represents the culmination of years of transectorial innovation (Théberge, 1997, p. 58) and it is a primary example of the kind of technical and cultural challenges that arise and get worked out as industries and products converge. The second half of the chapter considers how the movement of music onto computers called into question the status and the character of the music commodity. Stripped of the physical packaging that accompanies CDs, tapes, or records, music as a digital file was initially an unmanageable commodity that was open to a virtual re-packaging. As one of the first widespread computer programs to mediate between users and their music, Winamp was a cultural interface that presented and represented sound and filtered how users thought about, interacted with, and experienced music. Embedded with a mix of skeuomorphs and sketches of future possibilities, it borrows from past designs, devices and conventions of music playback in order to transition users to newer practices. In doing so, the media player set the context in which a digital music commodity could exist. Although Winamp became the rebellious poster player of the "mp3 generation" and its makers had an ambiguous relationship with early efforts to create a market for the sale and distribution of digital music, the software contributed to a new environment, beyond the confines of physical packaging, within which users could play, store, hear and see music as a commodity. Winamp and the migration of music onto computers represented a zero moment that simultaneously called into question the status of the recorded music product while presenting digital music as a viable commodity.

System Requirements

Winamp is the culmination, and yet another example, of the transectorial developments taking place in computing and music toward the end of the last century. Shortly after its launch in 1997, it became one of the first widely used programs for the playback of mp3 and other digital files on computers. It was intimately linked to the rising popularity of mp3s. Although it did not draw the same kind of music industry ire that Napster did, it was nevertheless seen as an enabling technology in the movement towards music as a digital file outside the confines of the compact disc (Atwood, 1997; Behar, 1999; Greenfeld, et al., 1999). Winamp still exists today, though competition in the media player market has grown significantly (from the likes of iTunes, Windows Media Player, MusicMatch, RealJukebox, etc.) and the software's influence has declined as a result. However, Winamp's early prominence in this area and its unique mix of features set the standard for the design of many of today's best known media players. Moreover, the program's interface and the practices it encouraged and discouraged contributed to one of the first coherent visions of digital music as a commodity. It repackaged music for the computer embedding it with new extra-textual materials. Before considering this argument in greater detail, the following sections first review the moment out of which the software emerged and consider some of the conditions that helped prepare recorded music for computers and vice versa. The political economy of Winamp's development from hobby project to an offshoot of a multimedia tech giant underscores the difficulties that arise when industries and their commodities converge and the significant innovation that occurs in the grey area between new ideas and established legal and commercial practices. It also highlights how readily optimistic ideas about technological development spilled over into discourses surrounding digital music.

The shift to a digital music commodity is intimately linked to innovations in computing, though the computer was not initially a device designed for the playback of popular recorded music. While we take sound on computers — and the ability to play CDs in them — for granted today, these capabilities are relatively recent and were not immediately obvious in the 1980s and 90s. A whole series of technologies and practices had to be translated onto the computer in order to make the playback of recorded music possible. The last two decades, then, brought not just changes to music, but also to the capabilities of both music and computers as a result of transectorial innovation. Take, for example, a piece of software called Music Box from a company named Trantor. Released in 1991 for $59, the software helped users play audio CDs in the CD-ROM drives of computers. Generally, CD-ROM drives played CD-ROM discs; media that held video games, encyclopedias and other large database programs. Despite the fact that CD-ROMs and audio CDs looked and functioned almost identically, CD-ROM drives were not originally capable of reading audio CDs, with the exception of a few "audio-enabled" or "Option A" drives (Grunin, 1991; Manes, 1989). This is where the Music Box came in:

> In addition to merely letting you play a CD straight through, the software allows you to choose a desired track, randomly shuffle tracks, repeat an entire disk, search forward and backward, pause a track, and select audio channels left, right, both, and mono). It displays a digital readout of time remaining on a disk, time remaining on a track, elapsed track time, or elapsed CD time. (Grunin, 1991)

The novelty of Trantor's Music Box was that it turned the CD-ROM drive and the computer into a stereo like device for music playback. It helped bring familiar features to a new device. Functions like pause, search and shuffle were novel enough at the time to warrant special mention in Grunin's review of the software — an indication of how inferior the computer had previously been as a playback device.

The very existence of Trantor's program and others like it speaks to how foreign the concept of using computers for music playback was, even in the early 90s. Music Box is a reminder that a whole series of technologies and practices had to be translated onto the computer in order to make music playback possible. Sound on personal computers was an afterthought, and using the device for general music consumption was clearly a side interest for developers, at least initially (Petzold, 1991). Although early mainframe computers of the 60s and 70s were entirely capable of (and in some cases designed specifically for) processing sound, and many electronic music composers had been experimenting for decades with computer music (Manning, 2004), audio faded to the background when "personal" computers emerged in the 1980s. The first personal computers were office tools, calculating machines to enhance productivity at work (Friedman, 2005, p. 102-110, 121). The earliest successful programs were spreadsheet applications like VisiCalc (Friedman, 2005, p. 102-105). Put simply, computers were not initially designed or perceived as entertainment devices (Friedman, 2005; Venkatesh, 1996, p. 48). Even when computers started appearing in homes, they were usually located in offices or studies and treated as extensions of the workplace with limited usefulness in other realms (Venkatesh, 1996; 1987).

CD-ROM discs and drives proved to be Trojan horses for getting recorded music onto the computer. Originally conceived for storage — many CD ROMs were bigger than hard drives at the time — reference, and gaming purposes, they also introduced users to the possibility of playing CDs on something other than a CD-player. This is not to dismiss other musical-computer related innovations, like the emergence of the Musical Instrument Digital Interface (MIDI) standard in the 80s, the addition of processors and microchips to synthesizers, or other various musical hardware and software innovations from companies like Apple, Amiga and Atari (for more see Théberge, 1997, p. 83-90; "Winning Hearts" 1989). These developments were certainly central to the evolution of soundcards and other multimedia features that pushed the computer beyond publishing and calculating. However, CD-ROM drives most directly played a role in the re-conceptualization of the music commodity. They made CDs playable on computers. CD-ROM drives also brought verbs like "ripping" and "burning" to the music experience (i.e. extracting data from, or storing data to, discs). Although this was more of a lexical innovation than a functional one — making a mixed cassette tape from a CD is just a less efficient version of the same process — burning and ripping amplified and digitized music's copy-ability and portability.

The computer's ripping and burning capabilities were initially limited, technically and economically. When Sony and Yamaha introduced a CD burner for desktop computers in 1989, priced at a stunning $30,000, it is hard to imagine consumers were lining up for the devices (Feeley & Stefanac, 1995). Although the cost would drop to a few hundred dollars a decade later (Somogyi, 1998), burning music was still technically complex. A 1996 "How To" guide for burning CDs coaches users through a 6-step process that involves preparing the data, partitioning the hard drive, connecting peripheral cables, and turning off all other computer applications (Breen, 1996). Ripping music was equally challenging. Even when CD-ROM drives could read the data on audio CDs, there was no easy way to extract this information to a usable format on the computer. Innovative users, like those at the start of this chapter, could plug a microphone into the input on their computer and digitize by recording the analog output, though this primitive ripping resulted in a noticeable decrease in audio quality (Gruberman & McQuillin, 1991). By the early 1990s, programs like cdda2wav and XingSound emerged to offer users the ability to transfer music truly digitally, though their functionality was basic. XingSound — which launched in 1993 as the first commercially available real-time audio encoder — had playback functions that did not even include a "pause" button (Amorim, 2007; Ness, 1993). As advanced as its encoding and compression features were, the $100 software only let users open, play and repeat a file (Ness, 1993).

These awkward examples of ripping, burning and playback reinforce how ill prepared the computer was for handling the music commodity, or at least, for handling music in ways with which consumers were familiar. There was no obvious or simple connection between how music exists in CD format and how music should exist on computers. As much as CD-ROM drives opened the door for music on the computer, they clearly were not designed as musical devices. Digitization, compression, and decoding were separate practices that usually required dedicated software and hardware. Getting digital music onto the computer also required sufficient hard drive space on which to store and archive the imported content. Although a few dozen megabytes of data seems miniscule now, it was a sizeable demand at the time. Computers could not readily play music collections or convert them into digital formats. Computers had to become musical as programmers and users started conceiving of them as machines for music. As a result, there are handfuls of halfway technologies like Trantor and XingSound that exists as relics of transectorial innovation in process.

CD-ROM drives were part of the multimedia "revolution" of the late 80s and early 90s, a movement that brought a number of changes to the computer's audio and video capabilities (Friedman, 2005; Venkatesh, 1996, p. 121). Multimedia — more a cluster of technologies, applications, and hardware developments, than a singular technology per se — was a "catchall phrase for the convergence of media technologies with computing" (Angell & Helsop, 1993). Hardly a unified movement, the arrival of multimedia was a disorganized transectorial collision that lurched forward in fits and starts and was fuelled as much on hype as on actual innovation. However, the vigour with which companies of all kinds embraced and pursued multimedia made it more than a benign technical description of convergence. It was a particular vision of what the computer could and should be. It was a way of imagining computing and the role computers should play in our lives. Like Moore's law — which, upon analysis, looks more like a collective goal than a scientific law (Auletta, 2009, p. 52; Friedman, 2005, p. 88; Sterne, 2007, p. 20) — the multimedia revolution was a disparate effort on the part of manufactures, software developers, and tech journalists to expand the market for personal computers.

In many ways, multimedia was another step in the technical and cultural re-imagining of computing taking place throughout the 1960s, 70s and 80s. In their respective histories of the computer, Fred Turner (2006), Ted Friedman (2005) and Paul Ceruzzi (1998) have all outlined developments that helped transition computers from abstract mainframe machines to "personal" devices throughout the last half of the 20th century. They note that the popularization of the computer was entangled with visions of computing as a means for individual and collective transformation (Friedman, 2005, p. 81, 161; Turner, 2006, p. 105). Turner (2005) in particular discusses the links between computing and the countercultural New Communalist movement of the 60s: a group of "back-to-the-land" bohemians who set up alternative communities in the "wilds of new Mexico and Northern California" (p. 487-488). Their migration is usually framed as flight from the dominance of big corporations and the trappings of city life, though Turner (2006) argues that these communities not only believed fervently in the power of nature, but in the radical possibilities of technology too. They were also not averse to capitalism. They formed their own kind of economies and networks of commodity circulation through publications like the Whole Earth Catalogue (Turner, 2005, p. 487-488). Noting the crossover that occurred between key figures in this community — Stewart Brand, for example — and the emerging computing and technology scene in California, Turner (2005) shows how the New Communalist ethos of personal and collective autonomy and expression through technology were part of the social construction of early computer technologies (p. 493). The development of the Internet and the World Wide Web as media forms were further nudges towards making the personal computer a multimedia device with socially transformative capabilities. Turner (2006) describes early online Bulletin Board Systems (BBS) and communities like the WELL — for Whole Earth 'Lectronic Link, an online evolution of the Whole Earth Catalogue — and how they espoused New Communalist optimism for technology's ability to re-fashion commercial and cultural life (p. 141).

The migration of music onto the computer, then, was not just about getting music onto a new device. It was intimately tied up with a long-held image of computers as objects for aesthetic self-fashioning and "small-scale technologies [...] for the transformation of consciousness and community" (Turner, 2005, p. 489). Early online music sites like the Internet Underground Music Archive (IUMA) — a very early social network (1993) for musicians to post and sell their music and merchandise — and other music-based newsgroups and BBSs emerged in this context (Alderman, 2001, p. 12-14; Haring, 2000, p. 36-38). They seemed to share a New Communalist vision of the Internet and computers as a way to re-work the production, distribution and consumption of music. Elsewhere on the Internet, music enthusiasts were converting and uploading bootleg versions of concerts, b-sides and other rarities. Fans created entire sites devoted to the music of their favourite artists and posted MIDI files for users to download and play context (Alderman, 2001, p. 28-30; Haring, 2000, p. 83-85). Music, long an important cultural tool for personal expression, seemed a well-suited partner for computers that were envisioned as multimedia tools of self-realization.

By the mid 1990s, users were increasingly ready for music on computers even if computers themselves were not necessarily completely equipped for music. Bandwidth and the speed/stability of average Internet connections were still far too limited to make the transfer and use of audio files a regular practice for many users.

Luckily, the development of music on computers benefited from more general research on compression and digitization technologies taking place in other sectors. During the early and middle parts of the decade, a number of companies started working on new music formats to make sound more suitable for computers and the web. Some of these formats were intentionally designed for music. Others were by-products of work on other projects. The mp3 format, for example, was the result of research conducted on behalf of a broader consortium of radio and television broadcasters and the film industries (the "mp" in mp3 comes from MPEG — Motion Picture Experts Group). A German engineering company called the Fraunhofer Institute started working on the technology in 1987 in the hopes of finding ways to compress digital video and audio for the purposes of transmitting and storing the large amounts of data that develops during the production broadcast content (Dowd, 2006, p. 219; Katz, 2004, p. 160). By 1993, the mp3 format was capable of compressing audio data to about 1/12th the size of the files on a CD. The mp3's relatively small size made uploading and downloading much less resource-intensive with only a minor loss in sound quality (for more on the cultural history of the mp3 see Sterne, forthcoming, 2012). There were other compression and transmission formats in circulation as well. In 1995, a company called Progressive Networks (RealNetworks) introduced Real Audio (Haring, 2000, p. 65-66; Rothenberg, 1999). Whereas downloading songs with an average residential modem took users up to 14 hours to access a 3-minute song, Real Audio relied on "streaming": a process that broke audio files down into smaller parts and then reassembled them on the user's machine (Rothenberg, 1999). Streaming allowed users to listen to a file in real time — though anyone who has ever streamed over a slow connection knows the qualifier "real" comes with a grain of salt. Other companies introduced formats of their own, like Liquid Audio, a2b, Windows Media Audio and Advanced Audio Coding. Some of these were developed by prominent players (e.g. Microsoft, AT&T), others came from start-ups looking to fill a new niche in the music industries (e.g. Liquid Audio), and still others, like the predecessors of what would become Ogg Vorbis were open source community-based efforts (Haring, 2000, p. 64-68; 2009).

As with so many technological innovations then, the movement of music on to computers was also a story of competing formats. Although digital music's various formats offered slightly different functionality, they were also part of a larger struggle over the shape of the digital music commodity and the practices that would surround it. In general, formats are part of the wider protocols that govern technology. Gitelman (2006, p. 7) suggests that protocols include the specific technical details of how technology and media work, but they also encompass the conventions of how people use new devices, how they access them, and a whole series of economic and social infrastructure elements. Taking the phone as an example, Gitelman considers the social protocols that surround the device: the convention of answering with "Hello?", the economics of billing and rate plans, the type of access (i.e. home phones, public pay phones, etc.), the type of call (i.e. conference calls, long-distance relationship discussion, etc.) and other aspects of phone use. Since these protocols affect the uses and ends to which media and technologies can be put, they are, at their core, about control. As Alex Galloway (2004) argues: "Viewed as a whole, protocol is a distributed management system that allows control to exist within a heterogeneous material milieu" (p. 7). Spread across huge networks and different formats, protocols are a way to ensure certain outcomes, or at least limit the possible number of uses to which a device or technology can be put to use. For Galloway, this is particularly evident in the protocol of computer code and software: "code is a set of procedures, actions, and practices, designed in particular ways to achieve particular ends in particular contexts. Code = Praxis" (p. xii). Format decisions are as technical as they are social; they affect how files work but also the kinds of uses and meanings that develop around certain technologies and media.

As music moved onto computers and started to take on the properties of software, it was also subject to the control exerted by the protocols of its formats. Music as code meant that the music experience, in digital, would be a different one. Although each format (e.g. Real, mp3, Liquid, etc.) had unique technical attributes and features (i.e. audio fidelity, security, etc.), the real differences between the files were in their protocols: what users could and could not do with the files and the software that accompanied them. Some formats, like Liquid Audio, were proprietary and came with restrictions as to how they could be used or played (see Chapter 4 for further discussion). Others, like Ogg were available for use by anyone. The mp3 was hybrid of the two. Mp3 files were open, in the sense that they could be opened in a wide range of jukeboxes, audio editing applications and other multimedia programs but the format was still technically "proprietary" (Borland, 2000; Hansen & Van Buskirk, 2007; mp3licensing, 2009). Although users could get and play mp3s on a variety of players and devices without any kind of payment, developers of mp3-playing software had to pay royalties to the format's creators if they were large-scale commercial operations (mp3licensing, 2009). Open or proprietary, each format engendered its own protocols and offered its own version of the digital music experience. The differences between streaming and downloading, or the rest of digital music's various formats, were each expressions of what digital music should and could be.

This was the moment from which Winamp emerged. It arrived in a digital music environment crowded with different formats and technically complex playback technologies. It also appeared at a time when the promises and hype of multimedia were starting to concretize in technologies that brought added audio and video functionality to the computer. New Communalist ideals of the computer as a tool for aesthetic self-fashioning were mingling with new technologies for playing, sharing and discussing music. But even as CD-ROM drives, soundcards, and ripping/burning software and hardware hinted at a few possibilities for music on the computer, they were hindered by the complexity, variety and specificity of the different technologies required for digital music playback. The multimedia moment is a reminder that this object we call a computer is really a collection of technologies and practices. Its component pieces (the mouse, the keyboard, the soundcard, etc.) all have their own histories and protocols, despite the fact they are converged in one device. Although the last few pages have presented a necessarily brief and partial snapshot of the development of multimedia, it is important to foreground the complicated path music followed as it moved to computers. The recorded music commodity made its way on to the computer because of innovations in CD-ROM technology and other hardware, the development of new formats and software, and the proliferation of online communities, businesses and websites with an interest in music in some form. Far from a pre-planned industry-sanctioned format change, like the move to compact discs, the presence of the recorded music commodity on computers was more of a by-product of convergence and transectorial innovation in the 1980s and 90s. This is not to suggest that music on the computer happened haphazardly, but that it was only thanks to a series of hardware and software developments, from a network of competing companies, institutions and technologies, that consumers were able to enjoy audio on their computers.

BUILDING WINAMP

Credit for Winamp generally belongs to Justin Frankel, a computer whiz from Sedona, Arizona who dropped out of university in 1996 to work on a newly ignited interest in digital music and computer programming (Bronson, 1998; Frankel, et al., 1999, p. 9; Greenfeld, et al., 1999; Kushner, 2004).[3] Frankel wanted to design a program to play mp3s and other digital files he was finding online. He released the first version of Winamp in April 1997 (Version 0.02a). It was initially given away as freeware, though as the program's user base increased, Frankel and others developing the software encouraged donations from interested users (Haring, 2000, p. 99). Known more as formally as "shareware", this release strategy is a common tactic in the software industry. Sometimes the software's functionality is limited or crippled unless users donate, but in the early stages of Winamp, the $10 contribution was just that, a contribution. The donations brought enough revenue to pay for the bandwidth costs of hosting the heavily trafficked website and for Frankel to buy a used car (Bronson, 1998). As it grew, Winamp also relied on more traditional revenue sources like advertising. Frankel and friends landed a $300,000 deal with a

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[3] New technologies rarely emerge in isolation and are almost always the result of a network of ideas, practices and people. Winamp is no exception. The program's origins involve contributions and ideas from other programmers like Dmitry Boldyrev (Frankel, et al., 1999, p. 9), Tomislav Uzelac and claims of copyright infringement and fraud regarding the ownership of the program's central code (Haring, 2000, p. 101).

music merchandising website called Artist Direct (Alderman, 2001, p. 56). High tech entities like IBM, Compaq, Hotmail and ZDNet and traditional companies like Toyota and Eddie Bauer also ran campaigns on Winamp's site (Winamp, 1998). After a year and a half online — and before Frankel was 19 — Winamp.com was bringing in $8000 a month in advertising and the software had more than 15 million users (Greenfeld, et al., 1999; Kushner, 2004). With the money, Frankel and a few other software designers formed a company called Nullsoft, a nerdy jab at the dominance of software giant Microsoft.

Despite Nullsoft's reliance on traditional commercial tactics like advertising, the company still saw itself and its software as an underdog and troublemaker. Part of the reason for this image was because of Winamp's affiliation with mp3 files. Nullsoft marketed the software as *the* player for mp3 files. The format – which leaked from Fraunhofer to wider web users in the mid 1990s and caught on as an ideal technology for musicians, friends and strangers looking to share files online (Sterne, forthcoming, 2012) – quickly drew criticism from record labels and the RIAA, since it offered little means for tracking copyright infringement. Although some labels were curious about the possibilities of digital music and worked with the likes of IUMA or Liquid Audio on digital strategies to promote lesser-known artists (see for e.g. (Alderman, 2001, p. 15; Haring, 2000, p. 40), the majority drew the line when it came to mp3s (Alderman, 2001, p. 40). They ordered digital music sites hosting mp3s to shut down and waged a public relations campaign against the format and any company supporting it (Alderman, 2001, p. 30; Haring, 2000, p. 6, 41). Although the file format was not intentionally created for music, the mp3's open architecture meant that companies like Winamp could easily and cheaply create software built around mp3 capabilities, further propelling the diffusion of the format. The popularity of mp3s and of the technologies enabling them were widely seen as signs of a major disruption within the music industries. As Billboard writer Brett Atwood (1997) suggested, "The music industry should be afraid — *very* afraid."

Given the perceived threat mp3s posed to the traditional distribution and consumption channels for popular music, most of the major record labels looked skeptically upon Winamp (Behar, 1999; Greenfeld, et al., 1999). Nullsoft turned this skepticism into one of its key messages to users. This is most evident, for example, in the 300-plus-page book, *MP3 Power! With Winamp* (1999), co-authored by Justin Frankel and tech writers/consultants Dave Greely and Ben Sawyer. Ostensibly a how-to guide for using Winamp and other digital music technologies, the book establishes a rhetorical stance that pits millions of technology users and music lovers against a slow and out of touch music industry that is only interested in protecting the status quo. Rallying their troops, they write: "Call it an audio or musical renaissance of sorts, we will see a revival of artistic progress and achievement. The power to join this renaissance is right here" (Frankel, et al., 1999, p. 15). From the book's cover — lightening bolts striking through previous generations of audio technology like an old radio, a tabletop jukebox, and a gramophone — to its lengthy descriptions of different digital music services for the computer, the authors argue that digital music is not just a format, but a movement:

> In fact, what was once the moniker and file extension of just another file format has grown to a technology used by millions of people and is on the verge of revolutionizing the entire music and audio industry […] MP3 is a format, but to think of it as strictly just a format is truly missing the point of what it has actually become. (Frankel, et al., 1999, p. 31)

The book's charged cover graphics and language are a call-to-arms to use Winamp and join the mp3 revolution. Users who downloaded Winamp or played mp3s were not just exploring the possibilities of a new musical format; they were leading edge early adopters taking a stand against the unequal distribution of power in the traditional music industry.

As those who follow technological innovation know, new technologies are continually and consistently positioned as "revolutionary", a process that overrates the new thing in question and further robs the word revolution of any real meaning (Barney, 2007, p. 6-7). Entrepreneurs often seek out means of infusing particular objects or practices with radical newness in order to bolster their importance and appeal (Frank, 1997; Heath, 2005; Klein, 2000). In this light, Winamp was hardly new at all. Despite claims that Winamp was another game-changer, it was presenting itself in ways that were relatively common during the hi-tech boom of the 1990s, when the bubble that buoyed many "revolutionary" gadgets and software had yet to burst. Winamp's rhetoric partakes in what Barbrook (1996) describes as the "Californian Ideology": a mindset that sees the Internet and digital technologies as always inherently liberating. As Turner's (2006) research suggests though, this is not simply a matter of marketing. Winamp, and digital music more generally, was caught up in a wider discourse about computing, personal liberation and social transformation through technology. Like the hype that accompanied the drive towards multimedia more generally, *MP3 Power!* suggests that through Winamp, users could hold the balance of power over the corporations that have traditionally controlled the flow of music.

Winamp's underdog image came into question in June 1999, when Internet media giant AOL purchased the start-up for $100 million dollars as part of a $400 million dollar deal involving other online music entities (Kushner, 2004; Tedesco, 1999). Even though Shawn Fanning had just released Napster that same month, digital music was, at the time, still primarily relegated to Internet chat groups and other underground forums. AOL saw the Nullsoft acquisition as an opportunity to bring digital music to the (legitimate) mainstream (Kushner, 2004; Tedesco, 1999). Many Winamp enthusiasts — who were drawn to the rebellious aspects of the software and digital music — were unhappy about the AOL sale and equated it with selling out (Kushner, 2004). However, Nullsoft's relationship with its new mass media owners was one marked by tension (Kushner, 2004). Working styles at the start-up clashed with AOL's overly corporate approach (Alderman, 2001, p. 146-147). Nullsoft's attempts at being a revolutionary in the digital music movement were not always in sync with AOL's approach. Due to the multiple industries that were tied up in AOL's transectorial plans, Nullsoft's actions often had far-reaching consequences.

The best example of this was the March 2000 launch of Gnutella, another application released by Frankel and Nullsoft. Gnutella was a program/protocol that let users share files sharing through a decentralized network of computers, a set-up that Nullsoft hoped would make more difficult to shut down than programs like Napster (Gomes, 2000). Gnutella was both a response to Napster and to critics of the AOL acquisition. When Frankel and his colleague uploaded the program, they included a note saying "Justin and Tom work for Nullsoft, makers of Winamp and Shoutcast. See? AOL CAN bring you good things!" (Kushner, 2004). AOL was pulled in opposing directions. On the one hand, the company was aggressively acquiring new technologies and software programmers to develop its online presence. On the other, they were also looking to expand their ties to the content industries, making deals with major record labels and considering a proposed merger with Time Warner. To be fit to merge, AOL had to present itself as a good corporate citizen, one that respected the content and copyrights of its potential partner(s). Ultimately, AOL distanced itself from Gnutella, claiming it was an "unauthorized freelance project" on Nullsoft's part. A day after Gnutella was uploaded, AOL shut down the site (C. Jones, 2000a; Kushner, 2004).[4] After Gnutella, AOL ordered Frankel and his team to focus on Winamp but even their ideas on this front, such as an mp3 search engine integrated into Winamp's main interface, gave AOL grief (Gillen, 2000). Despite Nullsoft's initial optimism, Frankel and other employees never really fit in at AOL. By 2004 almost all of the team's original members had left (Kushner, 2004).

The troubled relationship between Nullsoft and AOL is not just a story of different working styles. It speaks to the difficulties that arise when companies with interests in multiple industries collide. Winamp was not necessarily the first program to combine music and technology, but its popularity and the ways in which it converged the two sectors made it a dangerous piece of software for certain actors. Had Nullsoft been working on an isolated piece of software, that was limited to a specific practice or industry, little fuss would have been made. Instead, as part of

[4] Although Gnutella's official existence was brief, thousands of users grabbed the program before AOL took it offline. Since it was an open source program, imitation versions of the program started sprouting up. Current peer-to-peer software like LimeWire, SoulSeek and other similar applications are based on its code (Kushner, 2004).

AOL, the programs they developed affected the field of computing as well as the entertainment and cultural industries. Frankel and his colleagues had envisioned digital music as an alternative form of music consumption, and Winamp as a tool to stir up the status quo. These ideas were sometimes in step with, and other times at odds with, the goals of its corporate owners.

Winamp grew from an idea to an integral part of an emerging market in a relatively short period of time. It owes much of this growth to the fact that it operated in a kind of industrial and economic liminal space: *between* sectors, in a marketplace where legal and commercial boundaries had yet to form. Nullsoft was allowed, perhaps even encouraged, to work on projects like Gnutella because the conventions of this new market and product were in a process of being worked out. This makes Winamp an exemplary case of transectorial innovation and of the wider economic and technical developments taking place during the dot-com boom and bust. It also helps temper Nullsoft's claims of disruption and rebellion. Nullsoft may have been trying, through Winamp and Gnutella, to re-imagine the way we consume and experience music. But they were also looking to position themselves as key players in the development of digital music's emerging market. Although this is evident, if somewhat troubled, from the above sketch of Winamp's evolution from a hobby project to an AOL sub-company, it is especially clear from an analysis of the software's interface and key features. Winamp's look and feel, on the one hand, seemed like a complete re-configuration of music consumption practices. Upon closer examination though, Winamp's design provided a new kind of packaging for music in its digital form, making it a unique and distinct experience that opened up the possibility for the commodification of music as a digital file. As such, Winamp's interface provided a glimpse of digital music as a commodity.

INTERFACE-LIFT

The recorded music commodity is part sonic part physical artifact (Wallach, 2003, p. 51). The transectorial movement of music onto computers called into question certain aspects of this commodity. Over the last century, recorded music has taken on several different forms (i.e. records, tapes, CDs, etc.) and each one has presented challenges for the various actors seeking to profit from it (Eisenberg, 2005; Garofalo, 1999). Despite the widely different designs, interfaces, and abilities of these technologies, the recorded music commodity has maintained several enduring characteristics. The media, usually fragile, is typically wrapped in some kind of packaging that is both protective and descriptive. It bears functional features, like the spine or barcode that help retailers and consumers alike order their shelves. Copying or replicating the commodity in its entirety was time consuming, and mass copying/dissemination was costly. Furthermore, the commodity had to be exchanged in person or through a regulated broadcast system. But the music commodity is much more than this. It has come to include a series of extra-textual offerings or paratexts (Straw, 2009, p. 86) whose purpose is to imbue the commodity with as much perceived value as possible. The packaging also contains images, artwork, liner notes, song names, lyrics, production details, or any other number of cues that play a role in how users find, sort, and relate to the music. These are supported by larger marketing and advertising efforts, as well as an entire star system built up through the music press, videos and other media that contribute to the overall character of the music commodity (Dyer, 1979; Negus, 1992). The music may be what the consumer is ultimately interested in obtaining, but the packaging and presentation is not simply a neutral container. This is the stuff that gives the commodity its exchange value and provides the materials and symbols through which commodity fetishism occurs.

In this light, the advent of Winamp can be read as an attempt to fill in some of the gaps created by digitization between music's previous commodity form and its future shape. In the simplest terms, Winamp is a computing solution. The problem was a desire to play mp3s and other digital music files on personal computers. The program, however, also addressed a cultural issue: to play music on a new device in a way that was as usable and understandable as it was on other devices that consumers were familiar with. Winamp was neither the first software media player of its kind nor even the most capable. The Fraunhofer Institute's WinPlay3 in 1995 and a versatile program called MuseArc probably deserve those honours. But even though Winamp was not as fast or as feature-loaded as its competition, it was perhaps the first to understand, or at least internalize, the cultural dimensions of technological innovation and incorporate them into the design process. A journalist interviewing Frankel explains the motives behind Winamp's look:

> He wanted to build [a software player] one that would look as familiar as a home stereo, with the sound quality jacked up with effects like 3-D surround sound and reverb. He also wanted a playlist feature that allowed you to sort MP3 tracks or play them randomly like a jukebox. (Greenfeld, et al., 1999)

The result was software that resembled a cross between a car radio and CD player (Frankel, et al., 1999, p. 48). It had the functionality of a CD player and the look and style of a high-end stereo's front panel. In many ways, Winamp's transectorial roots become visible through its interface; the design hints at conventions from computing, recording technology and stereo playback devices. Winamp provided basic controls like play, pause, skip tracks and the like, but it was how the software presented these features that made Winamp unique. Winamp used the malleable quality of the digital platform to give users added control and customization options over how the player appeared and how the music sounded. It took ideas from previous audio playback devices and reconfigured them in digital form. Although the software has been through multiple iterations and versions, Version 1.0 from 1997 contained features that still form the backbone of Winamp and many other digital players.

Put more theoretically, Winamp is a collection of what N. Katherine Hayles (1999) calls "skeuomorphs". Hayles adopts the term from archaeology and architecture to explain how computer systems, and technologies more generally, evolve. A skeuomorph — a complex-sounding term that describes a relatively simple, but useful concept — is "a design feature that is no longer functional in itself but that refers back to a feature that was functional at an earlier time" (Hayles, 1999, p. 17). Skeuomorphs explain the appearance of the old within the new. Plastic tables that have a wood-grain pattern on their surface, the copper colour of zinc pennies, or the recorded "click" you hear when the "shutter" on a digital camera takes a picture are all skeuomorphic in nature. Skeuomorphs are everywhere, if one cares to look. Software designers regularly borrow cues and signals from the non-computer applications they are trying to emulate so personal computers are filled with them: the trash can icon, the "file" and "folder" icons that resemble those in our office drawers. Their presence no longer attests to their original functions, yet the ideas they represent remain embedded in the design.

Skeuomorphs are more than just a design concept, though. As computer researcher Nicholas Gessler (1998) suggests, they are templates for thought and experience:

> Skeuomorphs are material metaphors. They are informational attributes of artifacts which help us find a path through unfamiliar territory. They help us map the new onto an existing cognitive structure, and in so doing, give us a starting point from which we may evolve additional alternative solutions. They provide us with "a path" instead of "no path" at all. (p. 230)

Skeuomorphs are crucial for innovation. The incorporation of past appearances and design ideas helps smooth the process of adoption and makes new technologies feel more familiar. Skeuomorphs borrow from the past to make the future possible in the present. New interfaces and technologies are always a careful balance between the new and the known. The successful diffusion of any technology requires that it not be so new that consumers cannot recognize it. As Hayles (1999) suggests, new innovations put in play "a psychodynamic that finds the new more acceptable when it recalls the old that it is in the process of displacing and finds the traditional more comfortable when it is presented in a context that reminds us we can escape from it into the new" (p. 17). Skeuomorphs are vestiges that represent the material weight of the past on the present (and the future).

In this light, it is not surprising that Winamp's early design draws heavily from previous standard audiovisual conventions but presents them in new ways, providing a novel music listening experience. The very idea of playing music on the computer was still so new that Winamp's design had to account for the fact that, for many users, Winamp was their first experience with digital music. Winamp mimicked practices users knew in order to make the process of adapting to new behaviours less daunting. It included enough links to older media devices (e.g. CD players, Video Cassette Players, etc.) to feel familiar while at the same time it introduced new features (e.g. Visualizations, Customizable Playlists, Skins, etc. which I describe below). As a program that introduced millions of users to music on the computer, Winamp had the twin task of acclimatizing users to a new technology for music consumption and, more broadly, teaching them to treat computers as multimedia devices that could be part of a home sound system. Winamp had to sell itself as a program and digital music as a possible new format for the consumption of music.

Figure 1 - Winamp Main Window
Winamp's main playback window, featuring transport controls (play, pause, stop, etc.), volume, file details and the spectrum analyzer (the bars underneath the time code). Screengrab from the Internet archive's version of winamp.com.

Winamp's main window (see Figure 1) was a small console that contained the essential song data and the playback controls (Frankel, et al., 1999, p. 48). It also housed the Spectrum Analyzer: a series of bars that rise and fall based on the frequencies of the song that is playing (Frankel, et al., 1999, p. 49). The spectrum analyzer's visual representation of sound complements the equalizer (EQ) feature.

Similar in concept to some of the high-end stereo systems or portable audio devices available at the time, the EQ window let users affect and customize the sound by moving volume sliders (see Figure 2). Considering the perceived lack of sound quality mp3s provide compared to other audio formats, the inclusion of the visual equalizer may seem comical. However, it can also be read as a response to that criticism. By giving users the ability to manipulate a visual representation of the sound spectrum, Nullsoft at least engaged listeners with the sonic aspects of the music and provided them the opportunity to improve and personalize the sound. Winamp may not have offered the highest quality sound around, but it was at least sound that could be bettered. Both the spectrum analyzer and the EQ sliders were skeuomorphs that generated a visual illusion of high fidelity. Their presence is as much aesthetic as functional and positions Winamp as a multi-sensorial media player for audiophiles (or at least those audiophiles who had accepted the computer as an adequate music playback device).

Figure 2 - Winamp Equalizer and Playlist Window
Winamp's equalizer controls contributed to the stereo-like feel of the interface. The playlist window allowed users to cue tracks up for future listening. Screengrab from the Internet archive's version of winamp.com.

Figure 3 - Winamp Visualizer
Winamp's visualizer added abstract visuals that changed according to the characteristics of the music the program was playing. Screengrab from the Internet archive's version of winamp.com.

Taking the visual aspect of sound even further, later versions of Winamp offered "visualizations": abstract, computer-generated graphics that played along in real-time with the music (see Figure 3). Visualizations have their roots in the "demoscene"; a computer art subculture that combined programming skills, art, and eventually music (D. Green, 1995). In the mid 1980s when demos emerged, they were short audiovisual creations that hackers attached to cracked software to brag about their achievements (D. Green, 1995). Gradually, demos evolved into an art form for their own sake (replete with rave-like "demoparties" and psychedelic coding competitions). Many demoscene participants eventually put their skills towards coding video games and other software and their work is still visible in a most of today's media players (D. Green, 1995). Visualizations are in a certain sense pure eye candy — examples of amateur and professional programmers playing around and exercising their skills. They add to the "pleasurable" aspects of music listening and create "aural desire" through visual cues (Corbett, 1990, p. 80). Since the visualizations that result are tied to the musical attributes of the song, visualizations promote the act of watching, instead of just listening, to music. Like music videos or laser light shows, visualizations act as a kind of meta-art that use sound as the basis for an additional artistic statement. The visuals refract and reflect the sound and add value to the audio-visual experience (Chion, et al., 1994, p. 5). As Michel Chion (1994) has argued about sound and film, imagery and music have a particular way of working together that results in a different experience than if both were taken in independently. Winamp's visualizations are a stylistic interpretation of sonic characteristics, whose hypnotic, repetitive patterns — remnants of demoscene programmers with a healthy respect for raves and psychedelia — ask us to consider what there is to see in what we hear. They offer another way to "listen" to music, one that entails watching a cascade of colours, lines and shapes moving in time with the beat and in tune with the pitch.

Figure 4 – Winamp Skin
An example of one of the hundreds of "skins" user's designed for the program. This skin, fittingly, mimics the front panel of a traditional stereo system. Skin by Patrick Nourry, retrieved from http://only-freewares.blogspot.com/2008/04/pimeer-v2-2-ultime-home-cinema-skin.html

Winamp may not have been the first program to use visualizations but it helped popularize a stylized way of seeing sound on the computer. This is evident not just in the look of the sound, but the look of the player itself. Winamp's various windows came wrapped in a graphical look called a "skin". Users could choose from several different skins, each of which gave the player a unique look (see Figure 4). Nullsoft designed several standard skins but there was also a sub-community of Winamp users who designed their own visual faceplates for the music player. Unlike a home stereo, users who grew tired of the look of Winamp had access to hundreds of skins to customize the look of the program. Along with Winamp's other key features (i.e. visualizations, EQ controls, playlists), skins can be seen as part of a larger move towards mass customization in consumer marketing (Andrejevic, 2002, p. 253-258). By providing consumers the ability to tailor mass products to suit personal preferences, mass customization and modularity seek to restore the individuality that is, supposedly, suppressed through mass society (Andrejevic, 2002, p. 256). Software programs like Winamp, and computer software in general take this modularity even further, since configuring options and preferences digitally is much easier and less resource intensive than mass customization initiatives with physical products.[5] Winamp's highly modular interface created an environment in which a high level of interaction with the music was encouraged. Instead of putting a CD in the stereo system and walking away, consumers now played with the look of the device through which they played music. Winamp's features invited users to play with the sound, to tweak the EQ, and to actively control the look of the player. They provided a novel and changeable setting through which users could explore their music. More importantly, digital music's modularity sold the digital dimensions of digital music; Winamp's flexible and customizable design was further support that computers were not just abstract machines, but tools for personal expression and self-fashioning through music.

Taken together, these features made up Winamp's "interface" and they played a crucial role in re-building music's materiality in its digital contexts. If digital

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[5] See for example Nike's build your own shoe campaign at nikeid.nike.com, or Jones Soda's design your own soft drink bottle www.myjones.com.

music seemed like an immaterial experience compared to its analog precedents because of its lack of paratexts, features like visualizations, the EQ spectrum and skins rehabilitated these aspects of the music experience. The interface provided new avenues for interaction with music. Users were constantly tweaking and altering the interface and experiencing music's micromaterials in the process. Winamp's interface allowed for what Steven Johnson (1997) — in a discussion about graphical user interfaces more generally — calls an illusion of "tactile immediacy": even though the interface was actually another layer of data between users and their information, the ability to directly manipulate the interface made it seem "as though the information was now closer at hand, rather than farther away. You felt as though you were doing something directly with your data, rather than telling the computer to do it for you" (p. 21). Through Winamp's interface, music as a digital file became visible, audible and realizable as a distinct musical experience.

As one of the first programs to introduce users to the concept of digital music, Winamp's interface showed users what music looked like on the computer and what they could do with it and to it. It gave music a new packaging. Like media more generally, interfaces are hardly neutral conveyors of messages. They are designed with specific goals in mind, with specific permissions and restrictions; they represent the culmination of distinct modes of thought. As Manovich (2001) notes:

> The interface shapes how the computer user conceives of the computer itself. It also determines how users think of any media object accessed via a computer. Stripping different media of their original distinctions, the interface imposes its own logic on them. (p. 65)

The interface conditions our relationship with the computer and with the media objects we interact with on the computer. For Manovich, the interface is more than simply a technological design; it is a socio-cultural mode of representing and experiencing information. He uses the term cultural interface — which complements Hayles' (1999) notion of skeuomorphs, or Bolter and Grusin's (1999) arguments about remediation — because almost everything the computer displays is a reconfiguration of previous media forms and practices (Manovich, 2001, p. 70). Moreover, interfaces are boundaries between humans, computers and culture; they "present and allow us to interact with cultural data" (Manovich, 2001, p. 70). Manovich is particularly interested in which modes of organization and presentation prevail. The "files" and "folders" on our "desktop" are only one possible system of expression among many (p. 70). Culturally, however, there is a certain weight to this particular organization, one that depends on familiarity, habit and practice. Winamp's volume sliders, for example, could have been blank boxes to which users could assign a numerical value that would dictate the volume. The play and rewind buttons could have been a scroll wheel, with the ability to set the direction and playback speed of a song. All these options are possible within the digital realm (and are indeed found in other audio software) but they are not options Winamp espouses. Instead, the software is designed to mimic the control users had with existing sound playback devices.

Decisions at the level of the interface promote or encourage some behaviours or modes of interaction and make others "unthinkable" (Manovich, 2001, p. 64). Like skeuomorphs that constitute them, interfaces embody certain ways of seeing, thinking, and experiencing (Gessler, 1998). The interface is a site where protocols become visible. Interfaces and their skeuomorphs integrate not only past design features, but also past practices and previous ways of thinking. As Gessler (1998) remarks: "We tend to fashion objects skeuomorphically. Once thought is given material substance, it is not always clear what is a skeuomorph and what is not" (p. 231). Skeuomorphs, as material metaphors can condition the design and use of new technologies. They contribute to what philosophers of technology call *affordances* or *prescriptions* (Oudshoorn & Pinch, 2003, Akrich & Latour, 1992). Since the engineers who build and design technologies generally presuppose certain ways their creations will be used, the resulting technologies typically support certain uses and restrict others. Their use is, to some extent, prescribed by "what a device allows or forbids from the actors — humans and non-human — that it anticipates; it is the morality of a setting both negative (what it prescribes) and positive (what it permits)" (Akrich & Latour, 1992, p. 261). This is not to suggest the design of an object determine its use, but that its features and attributes are not simply innocent by-products. Objects come embedded with expectations about use and these expectations reveal something about the object, the people who made it, and those who use it (Latour, 1988, p. 306).

Winamp's affordances are clearest in an examination of the kinds of formats it could handle. Even though Winamp played a range of file formats, the program was primarily designed for mp3s that users found on the Internet (Frankel, et al., 1999; Winamp, 1997-1999). Winamp could play audio from CDs, for example, but it was initially an arduous task. For the first few years of the software's existence, playing CD audio required the use of an obscure plug-in called *Nullsoft CD/Line Input Player v0.100* (see "Advanced Winamp Configurations Guide" in Frankel, et al., 1999). Conceivably, this would not have stopped knowledgeable computer users. But the fact that CD compatibility was a plug-in, a technical after-thought, suggests that activities like managing and playing CD audio were not motivating forces in Winamp's design. Early versions of Winamp also omitted many of the CD handling tools now common in media players. For over five years, for example, users could not "rip" or "burn" CDs solely through Winamp. The program did not incorporate ripping and burning until the launch of Winamp 5, in 2003. Even then, the extent to which users could take advantage of these features depended on whether they signed up for the free "lite", "full", or paid "pro" version of the software.

Winamp's interface and skeuomorphs suggested that its designers saw the program as a stereo system: it was a playback device, not one for encoding or converting. It was an audio operating system, but one that was read-only. They optimized Winamp's features to enhance the playback of audio via computer-based sound files. They did not, at least initially, expect that a large use of digital music jukeboxes would involve importing audio from CDs or older recording formats. Despite all its other features, Winamp's basic offering to consumers was not designed for managing and maintaining CD audio. Pulling audio from, or storing songs on, CDs was mostly "unthinkable" through its interface. Even though Winamp was trying to transition users towards new modes of consuming music, it still relied on previous ways of understanding how we handle media. It saw digital music on computers as a separate trend from CD audio, and the result was an interface that, at least initially, allowed for limited traffic between the two formats.

Winamp's playlist window is another aspect of its interface that promotes certain ways of handling and thinking about music. In Winamp, playlists are re-configurable lists of songs that can be played back in sequence or "shuffled" into a random order. The term playlist borrows from radio broadcasting and the lists of songs radio station DJs design to play on air. Playlists also draw on previous practices and technologies like mix tapes or mix discs (Drew, 2005), though the nature of digital playlists shifts the scope and scale of these activities. Again, Winamp was not the first media player to make use of this feature but it was one of the first to put the potential of playlists on display by making them a central part of its interface. With Winamp, users could experiment with new kinds of musical organization. They could design playlists for certain moods (e.g. relaxing music), times of day (e.g. dinner tunes), occasions (e.g. party mix), or more personal/ eccentric choices (e.g. songs my dog likes). Playlists could range from a few songs to thousands, providing hours or days of continuous music. Instead of maintaining a CD or record collection arranged on shelves or buried in drawers, playlists became a lens through which to view and navigate personal digital collections.

Features like playlists, spectrum analyzers and other tools for manipulating music playback on the computer succeeded because they solved technical problems through cultural means: they made new technology feel familiar and less alien through aesthetic and design-oriented solutions. They brought a new materiality and vocabulary to the music experience (e.g. playlists, visualizations, skins, spectrum analyzers), though these were firmly rooted in practices and designs with which users were already familiar. They made the digital nature of music on computers seem more material. They also brought a whole series of computer-related practices to music; collecting and playing now involved clicking, scrolling, dragging, dropping, cutting and pasting. In this respect, Winamp was not just a specific application for the playback of music; it was a cultural interface that mediated our early relationship with digital music. It presented digital music to us and set the contexts through which we could interact with it. Winamp's interface made playlist windows, spectrum analyzers, and alternate modes of organizing music playback central features of the software and contributed to an overall conception of digital music more generally. Beyond Winamp specifically, these features also "sold" the digital dimension of music on computers. The highly customizable interface made computers less like abstract machines and more like personal devices for the fulfillment of individual musical expression (Friedman, 2005; Turner, 2005). By encouraging particular protocols and by making music visible and organizable on the computer, Winamp managed to exploit the capabilities of digital files as well as computer processing/storage power (limited as it was) to make music a far more versatile and flexible experience. In doing so, Winamp's features ultimately acted as building blocks for the commodification of digital music.

THE DIGITAL MUSIC COMMODITY'S ZERO MOMENT

The recorded music commodity on computers underwent a series of interface-lifts, a process in which it was stripped of some of its previous attributes and re-dressed with new micromaterials. Since the move to music as a digital file was not a specifically sanctioned format change driven by one industry in particular, digital music files shifted music from a defined product in a contained format to one among many other data documents that populate a user's computer. When users encountered music files online or copied songs from compact discs, they did so without the excess packaging of jewel cases, liner notes and other key signifiers (album art, band logos, etc.). Sounds and songs previously clothed in commodity packaging were left bare of much of their extra-textual context. This left digital files of recordings in a transitory state: not fully commodities yet not wholly detached from the broader forces, materials and symbols that make popular music a commodity in the first place. As Straw (2009) points out, this drift began with mixed CDs and the portability of the compact disc; by the mid 90s, CDs were regularly in motion and circulating (in cars, personal CD players, etc.) away from their packaging (p. 82, 85). The difference with digital files is that they migrated not only away from their packaging, but towards the computer, towards a new environment through which to use and understand the product. Temporarily and partially, the aesthetic and economic aspects of the commodity were called into question. What should digital music look and sound like? How should it function? What should users be able to do with music on computers? The answers to many of these questions were mutable and not necessarily given.

From a cursory glance, Winamp's interface innovations seem to exacerbate this process. Winamp took advantage of the fact that music, as a digital file, existed as individual units, to be moved, played and used separately. Winamp dispensed with the traditional packaging of the music commodity and added new kinds of visual and paratextual information to music that seemed to have little to do with selling songs. Winamp's conception of music represented a splintering of the music commodity and a re-configuration of the traditional affordances associated with music. Moreover, users didn't have to pay to use Winamp, and they could play an assortment of files through the program, regardless of whether or not they had paid for them. Although Winamp had technical limitations to the kinds of music it could accommodate, it made no distinction as to where the files it played came from.

Copyright-infringing files were just as welcome as any other type. The model on which Winamp operated seemed wholly removed from music as a commodity. This is part of what drove Nullsoft's belief that Winamp — and the mp3 movement it supported — might potentially disrupt the traditional music industry.

However, Nullsoft's faith in the power of its own software and the digital music movement surrounding it blindly celebrates the power of change new technologies offer, at the expense of critically considering how the logic of commodification was at work already in their own program. Winamp and digital files only really disrupted a particular form of the music commodity (namely, the CD) and a particular way of playing it (namely, on CD players). The larger marketing efforts that fed music's commodity status didn't simply disappear with the advent of digital files, leaving the music commodity as nothing but pure use-value. Recorded music files on computers, even in their most primitive forms, were still commodities in a certain sense. They were still songs that had value in relation to its other forms and formats. The sound, as well as the artist and production team that created that song still held residual cues to the commodity realm in which that song circulated. Winamp was part of music's interface-lift, but this did not necessarily make it a threat to music's status as a commodity. Rather, Winamp provided a vision for music's new format and new ways of playing it, extending the music commodity into the digital realm. When early music playback software like Winamp emerged it partook in a kind of rehabilitation process. Ostensibly a technology for playing music on the computer, Winamp also brought a whole series of protocols to the digital music experience; its interface and the features it promoted were an important representation of digital music at a time when the form and format of music were in question.

In this light, Jodi Dean's (2003) concept of the "zero-institution" is useful for qualifying the kind of disruption Winamp represented. Responding to claims that the Internet signals a re-vitalized version of Jürgen Habermas' public sphere — a kind of public sphere 2.0 — Dean instead suggests the web is a zero institution. She borrows the term from Claude Levi-Strauss and Slavoj Žižek to describe "an institution with no positive function at all: all it does is signal the actuality of social institutions as opposed to pre-institutional chaos" (J. Dean, 2003, p. 105). Zero institutions are empty signifiers, ready to be filled with meaning; they represent the "beginning or founding of something, marking that instance of transformation from the chaotic period prior to the founding" (J. Dean, 2003, p. 105). A zero institution is a way to explain diversity or difference within a unified system. The idea of a nation, for example, is a zero institution (J. Dean, 2003, p. 105); it is the thing through which competing claims are resolved or masked. Zero institutions explain how individuals can see themselves as part of a larger whole even though they may be radically different. Unlike traditional conceptions of the public sphere, whose ideal is the achievement of consensus among rational and informed participants, a zero institution represents the institutionalization of chaos. It brings together conflicting groups and disputed ideas and allows the participants to understand themselves as part of the same structure despite their irreconcilable differences.

For Dean (2003, p. 106), the Internet is technoculture's zero institution. It relies on a New Communalist type promise that anyone can have their say and can create change by doing so. It "enables myriad conflicting constituencies to understand themselves as part of the same global structure even as they disagree […]" (J. Dean, 2003, p. 106). The Internet is a particularly powerful zero institution because of the amount of disagreement and discourse that it can bear without actually disrupting the flow of capital, politics or power. The Internet's unity derives from the proposition that if users contribute comments, create content, and publish their own points of view, they at least share that in common with other users, whatever their disagreements. Ultimately though, for Dean (2003), the zero institution provides only an illusion of democracy and public engagement (p. 102). Zero institutions like the Internet simply enable what she calls "communicative capitalism": debate, engagement, and creation work in service of modern capitalism, not against it. It creates an environment where "social antagonism is simultaneously expressed and obliterated" and real structural changes are rarely addressed (J. Dean, 2003, p. 106). The net as a zero institution fosters a space for "politics without politics" (J. Dean, 2009).

This may sound like a heavy-handed analogy for Winamp. Moreover, if the Net is a zero institution, then applying the label to a specific computer program like Winamp seems redundant. With regards to the status of the music commodity, however, Winamp is part of what might be called a zero moment. Taking a cue from Dean, the zero moment represents a temporary and transitory point in time where the music commodity faces a moment of uncertainty, though this uncertainty is only conditional. It adds a temporal frame to the zero institution and suggests there are periods of innovation and change where there is the opportunity for different perspectives. With an unclothed music commodity circulating on the Internet and on computers, there were contesting views on the status and character of the digital music commodity. However, during such a zero moment, these conflicting views can co-exist despite their irreconcilable nature without actually upsetting the current balance of power or capital that drive the music industries. As with zero institutions, the idea of the zero moment recognizes that the turn towards digital music might challenge the interests of the dominant players, but it might also further them. In this light, Winamp's role was not solely to liberate music from the confines of its commodity status. It should also be understood as a starting point for the commodification of digital music. Despite its desire to play the rebel before, and during, its time at AOL, Nullsoft provided a vision for how the digital music experience should look and feel on computers.

Winamp's interface rebuilt music's materiality for its digital context. These digital paratexts wrapped music files on computers in a package that made them seem as useable and as enjoyable as other versions of the music commodity. Beyond its interface, Nullsoft helped commodify digital music in less subtle ways as well. The program generated over fifteen million users in less than two years, and many more in the years following. Winamp helped ignite an interest in digital music by conceiving of computers as advanced stereos and convincing users of this vision. Even though the program was primarily offered for free, it still hinted at the lucrative possibilities of an emerging digital music market. Many users "donated" money to Nullsoft — enough to fund server costs and other frills for Frankel until he sold his company to AOL — and even those who did not had spent money on related commodities like computers, Internet connectivity, sound cards and speakers. Nullsoft further catered to this market as the software evolved. In addition to charging for different "lite" and "pro" versions of the software, Winamp also started linking its software back to familiar outlets for the music commodity. Version 2.10, for example, included a mini-browser window (see Figure 5) that provided "information and web links relevant to the various mp3 files" a user was playing (Frankel, et al., 1999, p. 57). The default browser page was Amazon.com, where users could buy a CD of the very file they were listening to (the irony of being sent to buy something users already owned in another format was obviously lost on the browser technology). The mini-browser also linked to other established music resources (rollingstones.com, MP3.com, etc.). Although such an innovation could be expected of Winamp after its merger with media giant AOL, the release date for version 2.10 was several months before the acquisition. As such, the mini-browser suggests the software and the music files it facilitated were already linked to a wider market place of commodities.

Figure 5 – The Winamp Integrated Browser
Winamp version 2.10 included a browser that linked users to Amazon.com. Screengrab from the Internet archive's version of winamp.com.

Even a feature as basic as playlists bares roots of digital music's commodification. As discussed in greater detail in Chapter 4, playlists, at their core, represent a way of regrouping music that has become unhinged from its original context. If Winamp's ability to mix and match digital music files across a wide selection of artists, genres and albums called the very concept of the "album" into question, then its playlist feature emerged as a new form of ordering the music commodity. Playlists capitalize on songs as individual units, confined by no pre-set order or classification. Playlists support the idea of songs as individual units (commercial and aesthetic) while simultaneously recognizing that they take on other meanings when part of a larger whole. By regrouping and ordering music, playlists re-contextualize the individual songs that make them up. Originally presented as a technical solution for cueing up digital music files, playlists have now become an alternate and sellable way to package the digital music commodity that is widely used in digital music stores like iTunes (Drew, 2005).

The ways listeners experience music depend on what they can do with it. Winamp drew on familiar practices and designs and, in doing so, it engaged in re-contextualizing the music commodity for the digital realm. Winamp's interface and features made possible the playing and ordering of digital music in such a way that it could be repackaged as a new version of the same old commodity. Winamp's approach to music playback was a statement about how music should look, act and behave in its digital contexts. The features Winamp put forward as central to handling digital music, then, were simultaneously claims to reconsider practices of music consumption. Even though the program's designers did not intentionally set out to create a market for the sale of digital music files, Winamp's innovations to the interface of digital music created an environment in which the commodification of digital music could take place. By combining the past and the present in its interface and skeuomorphs, Winamp created a distinct experience for music on the computer that was different enough from previous experiences of the music commodity. In the process, Winamp hinted that music as a digital file was ready for its own process of commodification.

There is little doubt that the splintering of the music commodity into individual files on a computer has presented challenges for players heavily invested in sale of recorded music. Software like Winamp, whose technical design encourages users to re-organize music into playlists, manipulate it with equalizers, and visualize it through abstract graphics, certainly added to the chaos of this particular zero moment. However, it also signaled the potential of a variety of new services surrounding the digital music commodity. Winamp, of course, was not the only player involved in this process and the subsequent chapters examine other key developments along the road to commodification. As one of the first widely downloaded pieces of software for music playback (Bowman, 2006), however, Winamp played a particularly important role in transitioning users from playing CDs on their stereos to playing digital music files on their computers. It freed the recorded music commodity from some of its confines while at the same time laid the groundwork for the commodification of digital music. The move to the computer was the digital music commodity's zero moment.

The music industries have faced several zero moments since the introduction of sheet music and, as the concept of the zero institution suggests, the antagonism and chaos that gets created in such moments is not inherently disruptive. For the case of music, each new threatening technology was ultimately tamed or co-opted while the structure of the recording industry and its major players remained relatively unchanged (Chanan, 1995; Garofalo, 1999; McCourt & Burkart, 2003). Even with the perceived chaos of the current technological shift, as McCourt and Burkart (2006) argue, the potential of a more diverse and eclectic recorded music industry is quickly giving way to instances of control and ownership from the same cartel of major record labels that have consistently dominated the industry. In other words, this particular zero moment may have shaken the surface of the music commodity, but the foundation remains intact. It did not fundamentally change the idea that recorded music is still a commodity. The question facing those interested in profiting from recorded music in its digital form — and here I include not only record labels but also artists and a host of other actors — was not whether digital music could be a commodity, but how to proceed with its commodification. In this light, I turn now to explore the history of a feature that Winamp relied on heavily, and one that is a keystone technology for handling, sorting and seeing digital music: metadata.

Chapter 2 – Making Technology Behave

A Black Hole

At the time of its launch in 1996, the TuneBase 2000 probably sounded like a futuristic device. Its name called forth images of a yet-to-unfold millennium; its features promised a new world of sound entertainment. A combination of hardware and software, the TuneBase 2000 was a content management system for mega-CD changers (i.e. CD players that held dozens or hundreds of discs). It helped consumers play and organize their CDs. Multi-disc CD and DVD players were gaining prominence at the time, and the TuneBase 2000 — which held hundreds of CDs — was the cream of this particular crop (Wilson, 2000). What set the TuneBase 2000 apart, however, was not the number of CDs it could hold in its tray. Rather, it was because the device was essentially a small computer loaded with a database of information that included album names, track titles, and cover art for hundreds of popular CDs (Culbertson, 1997; Wilson, 2000). When users inserted a disc into the CD player, the TuneBase 2000 would "recognize" it, call up its associated information, and display it on a TV screen (Culbertson, 1997). Retailing for more than its numerical name (i.e. $2500) the device was admittedly geared towards a small market of rich audiophiles. But Scott Jones, CEO of the company behind TuneBase, hoped that falling prices and technological advances would lead to mainstream adoption. Plus, he argued it was meeting an important new demand: "These mega-changers have no idea what's in each individual slot. If you look at CD number 63, track 5, it becomes a black hole. No one remembers their CDs by number" (Jones qtd. in Pletz, 1998).

Today's music users do not need to remember CDs by number; instead, we have metadata. Among other things, metadata – the data about the data on CDs or in digital files – tell us what song we are listening to, which album it is from, and the name of the artist who is singing or playing it. Traditionally this information came from the packaging on CDs or albums, but the migration of music onto computers and computer-based devices created, in Jones' words, a "black hole": a space where no light seeped out, an information dead zone. Perhaps a touch hyperbolic, the metaphor rightfully points to the critical role information *about* our music plays in our experiences of music. Metadata help users recognize, sort, collect and use digital music. Metadata are both functional and aesthetic. They can be loaded with cultural cues and artistic flourishes or coded with technical instructions and marketing messages. Metadata are part of music's micromaterials and they mediate a listener's experience with the music commodity. Accordingly, this chapter reviews efforts like the TuneBase 2000 and other initiatives that sought to enhance the music experience through metadata. In particular, I trace the evolution of the Compact Disc Database (CDDB) and ID3 tags, two instrumental information technologies for music on computers and examine their contribution to the functional and aesthetic aspects of music in its digital form. Since both technologies started as hobby projects that derived much of their initial value from user contributions, I also explore what the CDDB and ID3 tags can tell us about the role of the user in the production of digital commodities more generally.

Despite their prevalence and importance, it is easy to underestimate the significance of the CDDB, ID3 tags and the metadata they provide. Technically speaking, they represent only minor feats of innovation — matching CD contents to an online database or providing labels for digital files. Like Winamp, ID3 tags and the CDDB grew out of programmers' desire to solve a specific technical problem. They are practical solutions for music that has been stripped of much of its extra-textual context. They work quietly in the background and when they work properly, most consumers barely notice their presence. The CDDB and ID3 tags offer music listeners near instant access to album metadata in a wide range of software and hardware products, but they do so with little fanfare. For many consumers, they have always just been there; digital music has never looked otherwise. Despite this quiet and subtle presence, metadata from ID3 tags and the CDDB condition much of the experience of digital music. They have grown from basic tools for categorization into central components of the digital music ecosystem that hold various other technologies in place and help them interact. Metadata may never garner the same amount of attention as Napster, file-sharing, or new business models, but the CDDB and ID3 tags are keystone technologies for digital music. They contribute to the commercial development and the social life of the digital music commodity.

This chapter also has a second major thrust, once again inspired by the TuneBase 2000. Escient LLC., the company behind the device, prided itself on "simplifying notoriously complex home electronics" (Escient, 1998). So much so that Jones was fond of claiming: "we make technology behave" (Culbertson, 1997). Aside from being a nice sound byte for reporters, Escient's unofficial motto of "making technology behave" speaks to a broader cultural conception of technology. The adoption and dissemination of new technologies always involves a kind of "domestication" (Silverstone & Haddon, 1996), a process in which users and the technology each change a bit as a result (Bijker & Law, 1992; Oudshoorn & Pinch, 2003). Escient's tagline admits that technology is difficult and that it often fails to do what it should do, *what we designed it to do*. Technology inherently misbehaves and we need to intervene. It is a fine bit of anthropomorphism, but it is not inaccurate. How many users have struggled with remote controls, computer software installation instructions, confusing cell phone menu structures, VCR Timers and on and on (Norman, 1990; Thimbleby, 1991, p. 4). The idea that someone could make technology behave is more than a marketing slogan; it is an insight into our relationship with the devices around us that signals a simultaneous desire for both user-friendliness and ever-more complex technologies. Part computer database, part CD player, the TuneBase 2000's rich interface promised to simplify multi-disc changers; to make CD collections behave. Extending this logic, I argue that metadata can be understood more broadly as a technology that brings order to misbehaving music files — files that were stripped of their context, complicating the process of commodification. As technologies like ID3 tags and the CDDB provided metadata to fill in the missing information of digital files, they helped music on computers look the part of a commodity. In short, they helped the digital music commodity behave like one.

GETTING META ON METADATA

Everyday, hundreds of thousands of computer users and music fans load music CDs into the disk drives of their computers. The action generally triggers the launch of an audio playback program, like Winamp, Windows Media Player, iTunes, or other similar software. Within seconds the screen flashes information like the name of the CD, the name of the artist, a list of songs, their various lengths, and other details. It is a process that occurs so quickly, it is easy to forget that a relatively complex set of connections, calculations, and processes are going on. To the unaware or the simply uninterested, it appears as if all the information was already there on the CD, ready to be revealed on screen. But the data is not on the CD or anywhere on the computer. If you have ever repeated the same process without a connection to the Internet or on an older CD player, you will quickly realize that instead of an informative layout of song names and album titles, all that appears is the most unimpressive of lists: track 1.cda, track 2.cda, tracks 3.cda… (see Figure 6)

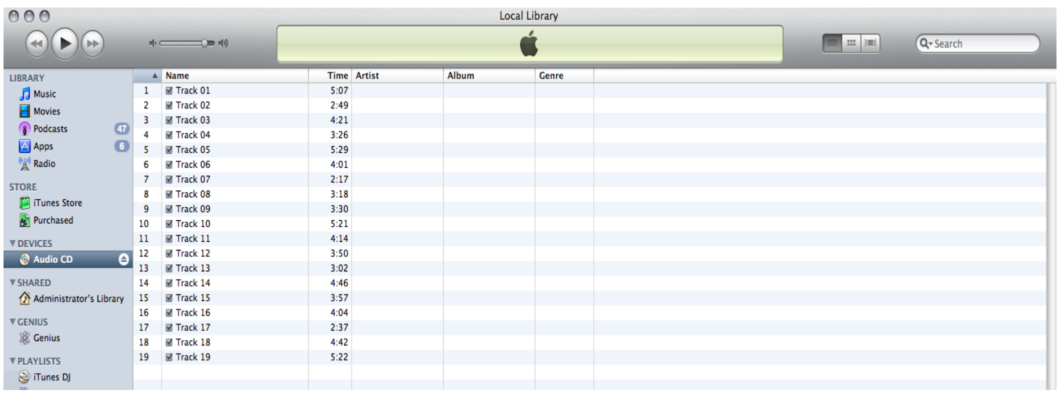

Figure 6 – Music without Metadata
A screenshot showing the contents of a CD without proper metadata in iTunes Media Player

The data that describes the music on the CD or in digital files – the data that turns track 1.cda into a more useful label – is commonly known as metadata. Metadata are not strictly a musical phenomenon. The term surfaces in the 1960s and is frequently discussed in literature on database management systems and library studies (Vellucci, 1999, p. 206). The topic's rise in prominence over the last several decades coincides with the digitization of data (of all kinds) and the need for librarians, archivists and hobbyists to organize electronic resources and Internet-based information (Campbell, 2007; Dempsey & Heery, 1998; Greenberg, 2003a, 2003b; Mathes, 2004; Vellucci, 1999). Although there are disciplinary debates about definitions, most agree that metadata is "data that describes the attributes of a resource, characterizes its relationships to other resources, […and that] supports the discovery, management, and use of a resource" (Vellucci, 1999, p. 205). Metadata are "structured" data and their main purpose is to support the functions associated with the object that they describe (Greenberg, 2003a).

On the surface, metadata for music help users and producers discover, label, manage, and embed digital documents and files with extra-textual information. Thanks to compression technologies like the mp3 and the increasing storage capacity of computers, music collections have ballooned from a few shelves of CDs to entire hard drives full of tunes. The mass accumulation and hoarding of digital music is a common practice, if not an inherent feature of music as a digital file (Burkart, 2008, p. 4; Sterne, 2006, p. 831-832). Faced with such massive libraries, metadata serve essential navigational and archival functions for sorting through this mass of files. They bring a basic level functionality to music on computers that allows for recognition, searching and sorting. But metadata's grander promise is to give us better control over our information, to make our music behave. Users could choose, for example, not to label their music, but this would leave them with a collection full of track ones and track tens, a prospect that is both daunting for the use of music and for its cultural significance. Metadata not only endow files with information and micromateriality; they also afford users with a certain level of control and ownership over that resource. Metadata open up a series of connections and possibilities for digital goods, as cultural objects and as commodities. Without data about your musical data, digital music files would make pale commodities: barely useable and faded versions of recorded music's previous formats.

It is no coincidence that, after being around for at least 4 or 5 years, the point where digital music starts to gain real traction in the mainstream is the same time that two key technologies to facilitate metadata management emerge. The CDDB and ID3 tags both started to gain wider usage in 1996 and 1997. They both began as basic means to address some of the fundamental issues of managing music on a computer (i.e. how should we label sound files conveniently for use?) but they evolved into complex technologies that go far beyond classification and categorization. In their absence, CDs on the computer would be just like CDs in any other device and electronic files would be nearly impossible to manage. Before conducting a full analysis of their features, a brief overview of the technologies, their histories and their import is necessary.

Like Winamp, the Compact Disc Database arose from a computer programmer rather than from someone working in the traditional music industries. The CDDB began as an offshoot of a Winamp-like media player called XMCD (Kan, 2004). On Nov.8, 1993, amateur software developer Ti Kan released version 1.0 on of XMCD, which included a novel feature that matched compact discs with information located in a database file on the user's computer (J. Fry, 2001; Kan, 2004). As users inserted CDs into their computers, XMCD searched the database file for CDs it "knew" and displayed information about the music (i.e. artist name, album title, track title, etc.) in the player's main window (J. Fry, 2001). The service caught on and soon XMCD users were emailing Kan information for hundreds of CDs to add to the database. Steve Scherf, a college friend of Kan's, later automated the process by moving the database to an online server (J. Fry, 2001; Van Buskirk, 2006).[6] With the CDDB online, users could access the database directly through media players like Winamp (instead of going through Kan). They could add new or edit existing entries by sending data to the CDDB. The CDDB did not actually change the data on the CD commodity; the metadata resided on the network. The CDDB gave the CD the appearance of having information on it that was not actually there. In August of 1998, Kan and Scherf sold the database to an electronics manufacturer. The move was controversial to some users, who watched the previously publicly compiled open source database become a private company's proprietary information. In 2000, CDDB was spun off into its own company, Gracenote CDDB. Its owners set about amassing key patents and licensing the database's information to software developers, device manufacturers and various companies involved in the music industries (Gracenote, 2001a; "Gracenote Hopes" 2001). In June 2008, Sony Corporation acquired Gracenote and the CDDB for $260 million dollars — a move that reflects the importance of information and metadata in the digital music realm ("Sony Corp To Acquire", 2008).

ID3 tags are more of a technical chunk of code than an information storehouse like the CDDB. Broadly put, ID3 tags are small bits of data included within mp3 files that describe a file's contents. Like the CDDB, ID3 tags were the by-products of work on another hobby project. Software programmer Erik Kemp had developed a program called Studio 3 for encoding mp3s. In it, he included a means for adding labels to identify mp3s (Nilsson, 2006a; Potts, 2002). The earliest version of ID3 — ID3v1 released in 1996 — was a relatively simple affair: a 128-

[6] Graham Toal was also instrumental in the founding of the CDDB. He provided server space for the database and suggested advertising as a means to generate revenue for the site (Van Buskirk, 2006).

byte tag at the end of an mp3 file to which users could add the track name, the artist name and the album title (each field had room for about 30 characters). Other users began building on Kemp's idea and adding complexity to the type of data ID3 tags could store (i.e. track numbers, longer field entries, etc.). In March 1998 another programmer, Martin Nilsson, created ID3 version 2 (Nilsson, 2006a). The update allowed users to add a huge variety of extra tags to their files (e.g. ratings, embedded pictures, production credits, tempo, etc.) and even to create customized fields of their own. ID3v2 currently has several iterations (ID3v2.3 and ID3v2.4 are the most common) and it is used in most digital music software players (e.g. iTunes, MusicMatch Jukebox, Winamp, etc.). Although not officially a technical "standard", the ID3 is the *de facto* format for mp3 metadata.

ID3 tags and the CDDB were solutions for music that was moving from one format to another. They were further evidence that the CD was not designed with computers in mind and that computers were not originally envisioned as consumer audio playback devices. It was technically possible for music to exist on computers, but CDs and early digital music files did not look like the music with which users were familiar. The computer both required and opened up the possibility for metadata beyond what came with music traditional packaging. As users put CDs in their computers and ripped music from its discs, the music commodity found itself in a far more visually capable medium than the original CD player or a basic car stereo. Initially, the CDDB and ID3 tags were simply a convenient way to label and organize music on the computer. However, as we shall see in the following sections, ID3 tags and the CDDB are now embedded or networked into many of the other technologies of digital music (from hardware like car stereos and portable devices to a wide variety of software players). In some ways, their subtle centrality to digital music creates what Ivan Illich (1973) refers to as a "radical monopoly":

> By radical monopoly I mean a kind of dominance by one product that goes far beyond what the concept of monopoly usually implies. […] I speak about radical monopoly when one industrial production process exercises an exclusive control over the satisfaction of a pressing need, and excludes nonindustrial activities from competition. (p. 22)

For Illich, regular monopolies limit freedom of choice. While they may restrict a person's rights in a particular area of choice, they do not tend to abridge liberties in other realms (just because one media company has a monopoly on the news and entertainment I receive does not mean they also determine what I can choose to eat, drink, etc.). Radical monopoly is a much less obvious kind of control but one that is ultimately more threatening since it imposes a kind of "compulsory consumption" (Illich, 1973, p. 22). Illich's best example is that of the car. He argues cars hold a radical monopoly over traffic, the design of our cities and the flow of people. Whether or not a person owns or uses a car, they are still ultimately affected by the ways the environment around bends and reshapes to accommodate the car. Cars have a "monopoly over land [that] turns space into car fodder" (Illich, 1973, p. 22).

Radical monopolies restrict choice but they also create dependencies on tools, services or information that people could otherwise provide themselves. Illich (1973) argues this is counter-productive for creating "convivial tools": technologies "that guarantee [people's] right to work with high, independent efficiency, thus […] enhancing each person's range of freedom. People need […] technology to make the most of the energy and imagination each has" (p. 6). Obviously, metadata are not as coercive and all encompassing as roads and traffic systems. But once users decide to adopt digital music, metadata insinuate themselves into the music experience in ways similar to a radical monopoly. Metadata exert architectural effects over the digital music commodity and exercise a significant amount of control over its use. They describe the information that accompanies music, and prescribe particular ways of classifying and sorting digital tunes. Metadata are a condition of use for the management and movement of digital music. The CDDB and ID3 tags are integrated and integral technologies: if consumers want to use digital music or CDs in computers, they will likely encounter the CDDB or ID3 tags. Like roads, they are part of the landscape for digital music. I turn now to explore the moment surrounding the CDDB and ID3 tags in greater detail. I focus primarily on the CDDB though my argument flips back and forth between the two technologies where appropriate. Ultimately, I argue that metadata are integral for making digital music act like a commodity and that the history of metadata and extra-textual information is a constitutive part of the music experience more generally.

Let's Get Digital

Although metadata technically exists for non-electronic resources, some scholars of information and library sciences see metadata as a strictly electronic affair (for an overview see Greenberg, 2003a; Vellucci, 1999). They reserve terms like "bibliographic data" and "cataloguing" for physical, non-electronic resources (e.g. a book's Dewey Decimal number or Library of Congress designation), though the distinction often breaks down in practice (Greenberg, 2003a, 2003b). While largely a matter of semantics, the disagreement suggests that digital and analog resources require and engender different cataloguing and ordering practices. Sure, digital data enhances both the amount of information that can be gathered and the speed with which it can be searched and used (Poster, 1990, p. 96), but these are shifts in scale and scope, not in essence. The debate begs the question: what, if anything, is new or different about digital metadata than the forms of extra-textual information that came before it?

Arguably, music has long had what we could anachronistically call "metadata". With the advent of recorded music came packaging and cataloguing features with which to distribute that music. Album art, liner notes, band photos, inserts, fold outs, etc. all contributed to the shape and materiality of the music commodity over the last century. CDs, tapes, and records each have their own kinds of paratextual information. Song titles, artist names, and production details are generally found on the packaging (i.e. on record sleeves, liner notes, jewel cases etc.) or on the media itself (i.e. stamped onto the actual plastic discs or cassettes). Arguably, even the grooves of a record are a form of metadata since, in their own way, they denote track numbers and lengths. Before digital media files though, most of the metadata was superficial. This is not to say artificial, but rather metadata had typically remained *outside* the actual media. The information contained in the CD, tape, or record was almost entirely audio data. Metadata for digital music, on the other hand, is embedded or networked into the individual file itself. It is designed for an era in which we are increasingly likely to encounter music that has been distanced from its packaging.

Of course, digital music is not the first kind of music that has been able leave its commodity packaging. Although the gramophone was not conducive to quick copying, the advent of tape and tape recording machines in the 1960s made it possible for the reproduction of entire albums, stripping songs and sounds from liner notes and other packaging in the process (Drew, 2005). Through tape technology, users could "hunt" for sounds (Bijsterveld, 2004), recombine their favourite songs, and share primitive "playlists" with friends (Drew, 2005). They even created their own versions of metadata; there is a world of wonderful metadata associated with tapes, ranging from the intensely personal drawings, writings, and scrawlings of friends on mix tape covers to the near exact album replicas of professional bootleggers (Heylin, 1994; Moore, 2004). This trend continued (and accelerated) once music went digital: blank CDs and CD burners took up where tapes left off (Drew, 2005). But the metadata for both mixed tapes and CDs, if present at all, is almost always tied to the packaging in which the format arrives. Digital metadata are embedded in the file or in the network to which that file connects.

The CD commodity does have some notable embedded metadata. Most CDs contain an extremely simple table of contents (TOC) that allows computers and other playback devices to recognize the start, end and duration of each track. During the encoding process, the TOC is written into a small non-audio lead-in portion of the disc. It tells users that a CD has 12 songs and displays the length of those songs. But that is the descriptive limit of the TOC. This is why a typical CD player displays that it is playing, for example, the third minute and forty-ninth second of song four. It does not indicate the song is "Stop Whispering" by Radiohead from the album *Pablo Honey*. This "limitation" is built into the original Red Book standard, the red-bindered document published in 1980 by Sony and Philips that governs the technical specifications of the CD format ("Philips Celebrates 25(Th)", 2007).

The original CD also included more industrial-purposed metadata like the international standard recording code (ISRC) code, which was designed primarily for producers and owners of recordings. Introduced in 1986 by the IFPI in conjunction with the ISO (International Organization for Standardization) the ISRC was a means of uniquely identifying sound recordings and music videos internationally (IFPI, 2009b). Assigned to individual recordings (not the physical carriers of the recording, or the individual songs), the ISRC is a string of digits that details the country in which the recording originates, the year in which it was produced and the label or registrant who owns the recording. The ISRC is an important feature for rights administration and royalty collection though it was never fully implemented across the industry (Pohlmann, 1992, p. 92-99). Like the Universal Product Code (UPC) on the back of most consumer goods or the International Standard Book Number (ISBN) for books, these kinds of metadata are crucial for tracking and describing products, but they have little bearing on how consumers handle their music.

Other than these and other very technical forms of metadata, there was little other information about the music embedded in the CD. The Red Book CD reserved most of its disc space for audio data. While the TOC was a step forward from blindly rewinding or fast-forwarding a cassette, or trying to find the right grooves on a record, it was not a terribly descriptive label for music that eventually found itself on the computer, ready to be played through a host of highly visual interfaces. Despite its limited descriptive capabilities, the CD's table of contents played an essential role in the CDDB's early recognition technology. Originally, the CDDB worked by fetching data about CDs from its online database. This process was primarily possible because of the TOC. When media players like XMCD or

Winamp read information from the TOC, they calculated that a disc had, for example, 13 songs and the first song lasts 3min 42sec, the second one lasts 2min 48sec, and so on. This information was sent to the CDDB, which searched its servers for correct matches (J. Fry, 2001; Van Buskirk, 2006). The database worked on the assumption that no two CDs had the exact number of tracks with the same lengths in the same sequence. In the event that several discs matched a similar profile, a prompt appeared allowing the user to choose the correct match. Interestingly, this meant that the CDDB worked entirely within the world of metadata. In order to serve its metadata, the CDDB relied on metadata that was already located on the compact disc. While the TOC might not have seemed like a very rich piece of information, it acted as a (virtually) unique identifier that allowed the CDDB to link CDs with a whole range of other metadata.

The amount of information included on CDs changed as advances in the mid-late eighties brought adjustments, modifications, and enhancements to the CD standard. Most of these addressed the growing use of CDs in computers (Pohlmann, 1992, p. 213-273). Known informally as the rainbow books — Yellow Book for CD-ROM standards (1988, CD-ROM), Orange Book (1992) for recordable and re-writeable CD-R and CD-RW discs, and Green Book for interactive multimedia discs (CD-I), to name a few — these innovations had uses beyond music, but record companies and technologists set about trying to use these new capabilities for marketing music. David Bowie's *Jump* (1994), Peter Gabriel's *Xplora1* CD-ROM (1993), Prince's *Interactive* (1994), Brian Eno's *Headcandy* (1994) and Todd Rundgren's *No World Order* CD-I (1993) were just a few examples of the kinds of "enhanced" and “interactive” CDs labels and artists were launching at the time.[7] Granted, most of these examples were not technically metadata as described above. Like the extra footage and content now regularly included on DVDs, they were attempts to create a new kind of music product by stuffing it with audio-visual extras (e.g. exclusive video content, games, audio remixes, etc.). These were commodities situated somewhere between music and metadata. They were one possible way the CD commodity could have migrated to computers. However, most of these endeavours were expensive and met with limited commercial success, at least as far as marketing music was concerned ("Philips U.S. CD/Flub-2", 1996; "Ziggy", 1994).

Sony and Philips did eventually find a way to add metadata to CDs. In 1996, they extended the Red Book standard to include CD-Text – a function that embedded data about the artist, the album and individual tracks onto the CD itself ("CD Text Specifications", 1996; "Sony, Philips Agree", 1996). CD-Text was clearly an attempt to address the increasing use of CDs in computers and other visually powerful devices and to overcome the CD’s lack of built-in metadata. It was also an admission that artists, manufacturers, and consumers had an ever-growing interest in linking information about the music to the music format itself. Unfortunately, CD-Text was introduced more than a dozen years after the original CD and it was not backward compatible (i.e. discs with CD-Text could display metadata, but the hundreds of thousands of discs produced before 1996 could not). CD-Text was also a Sony and Philips-based standard so not all companies rushed to add it to their

[7] Rundgren’s *No World Order* was reportedly the first commercial CD-I ever released. But Rundgren took the push towards new media one step further by giving himself the pseudonym TR-I — Todd Rundgren-Interactive — for the “albums” he released from 1993-1995. For Rundgren, interactive was not just a type of CD; it was a way of life.

CDs. While most Sony-produced CDs post-1997 have CD-Text capability, many others do not (for a quick unscientific check of the standard's diffusion, grab a handful of nearby CDs and see if they have the CD-Text logo).

CD-Text provided similar functionality to an earlier disc-based innovation: the Mini Disc. Launched in 1992, primarily by Sony, the Mini Disc (MD) was a small (2.5 inches) disc that combined the portability and record-ability of analog cassettes with the durability and random access features of a digital CD (Pohlmann, 1992, p. 265; Tsurushima, et al., 1995). Although the biggest selling features of MDs were their portability and their ability to record audio (something that was at the time not yet possible for CDs), one of the more interesting differences between MDs and CDs was the structure of the user table of contents (UTOC). Unlike the CDs TOC, the UTOC included metadata for track name, disc name and the date recorded. It was a small innovation and one that is barely mentioned in the engineering publications on the development of the mini disc (see for e.g. Ishida, et al., 1993; Pohlmann, 1992; Tsurushima, et al., 1995). But even the earliest MD recorders and players could label audio material and display metadata (see the instructions for the first MD player, the MZ1, lovingly archived at Minidisc.Org, 2009). This meant that even when users ripped songs from CDs, they could still identify and sort through them. With the mini-disc, users could see what they were hearing. They could select songs by name instead of by number. Despite its notable success in the Japanese market, the MD as a music format, at least in North America, has had little lasting impact on the music commodity (Dowd, 2006, p. 218; Mossberg, 1998; Trachtenberg, 1996). However the UTOC and the display screen were precursors for the functionality we find in digital files and devices today. MD players hinted at the idea that digital files, wherever they went, should carry information normally found in the music commodity's packaging.

In many respects then, the CDDB and ID3 tags are simply the next iteration of information that has long been a part of the music commodity. They are an evolution of the informational aspects of the music commodity — in the case of the CDDB, the transition relies explicitly on the technical aspects of a previous kind of metadata but repurposes it towards a different end. Digital metadata, however, do exhibit a key difference from their predecessors: they are embedded and networked into the commodity itself. As I argue later in the chapter, this has a significant impact on how digital music is put to use. Metadata become part of the product experience and are therefore intimately tied to digital music's form and functionality. On computers, users no longer had to listen to track one or track two; they could pick a specific song by a specific artist. This is the "black hole" initiatives like MDs or enhanced CDs tried to address. But while record labels, CD manufacturers and technology companies spent much of the mid-1990s struggling to make CDs and MDs more interactive and info-loaded, it was hobbyists and technologists experimenting with their own alternative ways of linking music and data that developed the de facto standards for digital music's metadata. This points to another key difference between ID3 tags, the CDDB and digital metadata more generally: their development depended heavily on the work and participation of its users and happened either outside or in parallel with more commercial efforts. The story of metadata, then, is not just a tale of industrial and technical innovation; it is one about users and their role in the commodification process.

HOUSES THAT MUSIC FANS BUILT

When Kan and Scherf sold the CDDB in August 1998 to an electronics manufacturer, the database became the company's private property. All the contributions and data generated by users was suddenly commodified and sold back to software developers. As a result, the story of the CDDB is usually told as an example of the corporate appropriation of user-generated content (K. Dean, 2004; Hemos, 1999; Howison & Goodrum, 2004; Lemos, 2001; Swartz, 2002). Indeed, the CDDB, as an open source and publicly generated database that was sold and privatized, seems like a textbook case for a Terranovian analysis of how the collective free labour of users gets integrated into the profit of private owners (Terranova, 2004, p. 73-94). Though this narrative is not without substance, it is also misleading. It steers us away from discussing the role of the CDDB and metadata more generally played in readying digital music files for their moment as commodities. The commodification of the database itself, in other words, is secondary to the way metadata was already at work in the commodification of digital music. An examination of both the CDDB and ID3 tags thus calls into question the role of users in commodification process.

Metadata creation has typically been the province of professionals, technical metadata creators (e.g. librarians, archivists) and others in charge of maintaining large databases (Greenberg, 2003a, 2003b). Though machines can automatically generate some metadata, cataloguing information tends to be centrally administered and relies on international standards. The MARC cataloguing practices at most libraries are a good example. MARC, or MAchine Readable Cataloguing, refers to the set of practices with which library catalogue cards are prepared and entered into the computer (LOC website). This allows library users to search a library's vast holdings by the computer and locate a book by its call number. These are highly structured classification schemes, they are generally static (i.e. they are slow to respond and adapt to new resources or new genres of information), and they require specialized training in classification systems, information standards, and in making sophisticated metadata-related decisions (Greenberg, 2003b). The Internet and the scores of documents found on it, however, have cast a new light on the issue of authority and control of metadata (Campbell, 2007; Greenberg, 2003b; Mathes, 2004). Top down/authorial metadata standards have started co-mingling with user-generated labeling systems (Greenberg, et al., 2001; Mathes, 2004). Think, for example, of tags added to photos on Flickr; small non-hierarchical keywords that users create to describe their pictures. Other users can then search for photos based on tags. These user-centric schemes are easier to use and often more participatory/accessible to a larger audience (i.e. almost anyone can enter a keyword while learning the Library of Congress Subject Headings list takes more time and effort). These types of systems are incredibly customizable but as a result they can suffer from a lack of consistency, universality, and accuracy when compared to more formal metadata generation techniques (Mathes, 2004).

Some media researchers refer to these kinds of organizational systems as "folksonomies": user-built and user-maintained classification schemes or repositories of knowledge (Mathes, 2004; G. Smith, 2008). Although folksonomies are slightly chaotic and sometimes inaccurate, they are more responsive to the different needs of a wider variety of users. Proponents argue that by turning the process of system organization into a shared communal activity, rather than an isolated professional one, folksonomies empower everyday users (Mathes, 2004; G. Smith, 2008). High profile examples ranging from Flickr to Wikipedia lend credence to the idea that, given the chance, users can create resources and repositories that rival or surpass traditional ones. Folksonomies are part of a broader trend that is generally referred to as "Web 2.0", a catch-all phrase for ideas, design trends and business models that position users as engaged and active media consumers who create and collaborate on the very products of their consumption (Allen, 2008; O'Reilly, 2005). It is a logic that is laden with optimistic and romanticized visions of web-based production (see for example Gene Smith's (2008) *Tagging: People-Powered Metadata for the Social Web*, with chapters on the power of folksonomies and "Metadata for the Masses").

In some respects, ID3 tags are an example of the utility of folksonomies. While manufacturers and labels were working hard to embed the CD with metadata, the mp3 format had much less industrial support — at least from the music industries. The primary institution behind mp3s, the Fraunhofer Institute, was a technology and engineering company. Although there was a broader consortium of actors involved in developing the format, most of them were concerned with issues other than recorded music (Dowd, 2006, p. 219; Katz, 2004, p. 160; Sterne, forthcoming, 2012). The initial drive to create a compressed audio file was for radio and television broadcast purposes (Sterne, forthcoming, 2012). Labels and other music companies, worried about the mp3's open structure as well as its associations with "piracy" and file sharing, stayed away from the format (Dowd, 2006, p. 220). So when technology enthusiasts started encoding music using mp3s, it is not surprising many of the features we associate with the music commodity were absent. Hobbyist programmers and users like Eric Kemp and Martin Nilsson started filling in the missing information, building on the mp3’s relatively open and non-proprietary format.

The CDDB shares similar folksonomy roots but on a much larger scale. Kan started the CDDB as an open-source project and he relied on submissions from other users to build the database (Van Buskirk, 2006). When the project moved online, Kan and Scherf watched the service mature from a catalogue of hundreds of CDs to a massive database with hundreds of thousands of entries. It remained free and open to all users, in large part because its contents were a direct product of the work of its users. Whether by sending emails to Kan or entering data into the CDDB online, users made minimal individual contributions to the database (i.e. logging a CD’s metadata every once in a while) and realized sizeable gains for the wider community. By January of 1998 the database had about 600,000 entries and its servers were receiving just under 1 million connections a month. These figures doubled over the next eight months, making it the most extensive service of its kind online (O'Malley, 1998; Pletz, 1998).

Shortly after Kan and Scherf sold the CDDB to an electronics manufacturer, the CDDB’s new owners released an updated version of the database called CDDB2 that was incompatible with the classic version (CDDB, 1999c). Initially they promised to keep the service royalty free for developers and users (CDDB, 1999c; Chalmers, 1999), though subsequent changes to the licensing agreements banned unlicensed use of the service (Chalmers, 1999; K. Dean, 2004; Hemos, 1999). Consumers could still access (and contribute to) the database for free, but software developers like Nullsoft had to pay licensing fees to incorporate CDDB2 functionality into their products. No longer just a user-generated database, the

CDDB was positioned as "a back-end infrastructure supporting targeted advertising, promotions, and e-commerce taking place within CDDB-enabled applications" (CDDB, 1999c). Music labels could also contribute "official data" to the database, which appeared along with unofficial consumer entries (CDDB, 1999d).

The new terms that came with accessing the site's metadata drew the ire of many CDDB users and open-source supporters, who spoke out angrily about the move and about Scherf's role in the sale (CDDB, 1999d; K. Dean, 2004; Hemos, 1999; Lemos, 2001).[8] Alternative, open source, and spin-off databases like Freedb and Music Brainz emerged in retaliation (Chalmers, 1999; K. Dean, 2004) but, in a move that further exacerbated the situation, the CDDB2 license stipulated (at least originally) that software companies must not offer access to databases other than the CDDB in their product (see for e.g. the case of CDDB vs. Roxio as described in K. Dean, 2004; Gracenote, 2001b). In a clear attempt to establish a radical monopoly (Illich, 1973, p. 22), the CDDB was using a moment of technical change to exert greater commercial and economic control of their product and to exclude "non-industrial" options from competition. Through licensing restrictions and technical design, they sought to establish sole control over the provision of musical metadata.

Given this trajectory of events, it is easy to see why the CDDB is usually described as a database for and by the people that got taken over by private company. On account of their many and dispersed contributions to the database, users felt a sense of ownership over the resource and a sense of betrayal when it was no longer "theirs". Instead of a powerful and productive folksonomy, one in which users collaborate to create new and unexpected uses for technology and knowledge,

[8] Scherf continues to be part of the company that manages the CDDB.

the story of the CDDB resembles more what Terranova (2004) and others (see for e.g. Coté & Pybus, 2007) have described as the exploitation of free or immaterial labour: the appropriation of affective or user-given labour into existing corporate structures. Terranova (2004) suggests that the incorporation of user-labour is a constitutive feature of the knowledge economy and the Internet. Scores of companies and Internet-based services are benefiting from "specific forms of production (Web design, multimedia production, digital services, and so on), but [also to] forms of labour we do not immediately recognize as such: chat, real-life stories, mailing lists, amateur newsletters, and so on" (Terranova, 2004, p. 79). Whether it is Silicon Valley employees working hours of unpaid overtime for the good of their company or individuals voluntarily contributing to databases, blogging or making other media, free labour makes up an increasing source of value in the contemporary moment (Terranova, 2004, p. 77).

One could imagine doing a Terranovian analysis of the CDDB. Here was a "house that music fans [had] built" (K. Dean, 2004) yet one in which they no longer felt welcome, a publicly compiled database put to private ends. Reams of user-created content became proprietary information and software developers and other companies (many of whom had contributed to the original database) had to start paying for the rights to use and access it in their services. The situation is akin to a private company acquiring a resource like Wikipedia and then changing the terms through which users and developers access and contribute to it. But even Terranova might agree that this interpretation is reductive. It blames the owners of the database and idealizes the role of the users. In doing so, it fails to consider the wider economic and social context in which the database was developed. That is, folksonomies and user-generated content may have the potential to empower users and generate new kinds of organizational systems, but this does not exempt them from the practices of capital or commodification. Free and immaterial labour develops alongside, not in the absence of, more traditional kinds of labour and commerce:

> These types of cultural and technical labor are not produced by capitalism in any direct, cause-and-effect fashion; that is, they have not developed simply as an answer to the economic needs of capital. However, they have developed in relation to the expansion of the cultural industries and are part of a process of economic experimentation with the creation of monetary value out of knowledge/culture/affect. (Terranova, 2004, p. 79)

User contributions, regardless of their voluntary nature, take place "within a field that is always and already capitalism" (Terranova, 2004, p. 80). As much as the CDDB was the product of the work of its users, it was also a project that involved a cultural good that had long been tied up in commercial and social life as a commodity.

If we frame the issue solely as a battle for control between industry and users, we miss an important insight: one of the database's key functions was to ready digital music files for their moment as commodities. It was a project in which both everyday users and the database's corporate owners were willing participants. Regardless of who was contributing to or controlling the CDDB, the database's underlying purpose was to rehabilitate the CD commodity on the computer. By adding metadata to music, by making discs recognizable, the CDDB endowed the music commodity with attributes that distinguished the experience of CDs on computers from that which came before it. Without the ability of software to automatically recognize and label CDs, users would have had to fill in song names, album titles and artists' names every time they inserted a CD into their computer (as they had to with early software jukeboxes before Winamp). This task became exponentially taxing when multiplied across multiple CDs. Faced with visual interfaces on the computer and other hardware for which the CD was never initially prepared, the CDDB was a new way to deliver old information. Kan and Scherf may have not have been driven initially by concerns with profit or control. But their desire to transition the CD to a new medium — a motivation shared by all CDDB's various users and owners — implicitly addressed some of the stumbling blocks to digital music's commodification.

Digital files, as immaterial unlabeled chunks of code, are a tough sell. Embedded with a name, an album cover, production credits and other information, they become sellable packages. They can be presented in online "stores", organized by genre or other useful groupings and sold in a variety of ways. The CDDB and ID3 tags brought value, in a corporate sense, to digital music by making it recognizable, sort-able and searchable. Metadata and the functionality that information enables makes digital music files into commodities that can command a price. As users embedded or networked digital music with information that resembled previous iterations of the music commodity, companies like Apple, eMusic, MP3.com, etc. could legitimately treat digital music as a commodity too, subject to the prices and practices that governed other commodities. As users helped develop tools to manage, organize, and experience digital music through ID3 tags and the CDDB, they were contributing to its commodification, long before the database itself was commodified. Metadata make up a defining organizational system for digital music and they are very much a co-evolution between everyday users, hobbyist programmers and companies in search of profit. As co-developers of the database, users shared the responsibility of making the digital music product something akin to a commodity. In addition to whatever creative and empowering benefits folksonomies bring, the user-generation of metadata actually implicates users in the process of commodification. In an environment where users are also producers, everyone can contribute to commodification. The line between user-generated content and user-generated commodities blurs.

DESCRIPTION AND PRESCRIPTION

I turn now to explore some of the specific impact metadata have on the music experience, since the discussion to this point has described mostly generalities. Metadata are highly constructed (Coyle, 2005, p. 160; Manovich, 2001, p. 224-226). Defining which metadata are relevant, which are not, and who has the right or the ability to inscribe and transcribe that data all influence the process of finding, managing and handling any given resource. Metadata are not organic or natural characteristics of objects; they are created with specific purposes in mind (such as classification, archiving, accessibility, etc.).

> Cataloging appears to be routine work so long as one believes that the materials just have a regular structure which can be trivially read off. But on inspection, it appears that this regular structure is the output of the work of catalogers, not the input. (Levy qtd. in Campbell, 2007, p. 15)

As much as metadata and cataloguing rest on the assumption that documents have concrete attributes that can be transcribed, ordered and retrieved (Campbell, 2007; Manovich, 2001, p. 224), the categories catalogers create are subjective and highly cultural. Like any system of classification, as Bourdieu (1991) might argue, metadata are both descriptive and prescriptive. The labels we assign to categorize the things around us are descriptive, but they also set up modes of perceiving and using those things. Labeling and classification are a kind of *performative utterance*: "a pre-diction which aims to bring about what it utters" (Bourdieu 1991, p. 128). Although sorting an album by artist or title seems like a basic and innocuous act — one that borrows from a century's worth of music-collecting practices and technologies — it also prescribes how users access and experience their music. ID3 tags and the CDDB are highly structured systems of labels and names that set out the categories that constitute the digital music commodity.

Initially, the fields of the CDDB were relatively basic (e.g. song title, artist name, album title, release year, etc.), but the number of fields expanded as the database grew (e.g. credits, label, web URL, notes, beats per minute, etc.). Users could submit information about a CD by entering information directly on the CDDB's website, though most users generally did so through the individual software they used to play music. This information is never "embedded" into the CD, though once entered into the database, it can be used to recognize other queries for matching discs. Metadata for mp3s, on the other hand, reside in frames that are located at the beginning of the file.[9] ID3v1 only allowed for a fixed amount of characters and fields in a 128-byte tag but ID3v2 had variable length "frames" that left room for up to 256 megabytes of metadata. ID3v2 thus pre-defined a long list of frames, including an "attached picture" frame for album art or other icons, a "beats

[9] ID3v1 actually placed the tag at the end of the file, which took longer to process and caused difficulties during streaming.

per minute" frame to log the pace of the song, as well as frames for lyrics, the composer's name, the date recorded, comments, and other information (for a full list of frames see Nilsson, 2006b).

Aside from basic metadata used to sort and organize music, ID3v2 contained metadata that could tweak the actual sound of the audio file. The "relative volume adjustment" frame let users align the output volume of their files while the "equalization" and "reverb settings" frames coloured the frequency and echo of the sound. Metadata, in this case, was not only acting on the file but on the sound itself. ID3v2 also came with a "Music CD Identifier" frame that was specifically designed for users looking to link mp3s with CDs. The frame's design allowed users to dump data from a CD's table of contents into the file or for software programs like Winamp to embed this data automatically during the import process. The Music CD Identifier frame also enabled mp3 files to access the CDDB. This frame provided a tight connection between CDs, mp3 files and the CDDB. Although it is unclear to what extent there was a formal affiliation between the CDDB and ID3 communities — Steve Scherf and Ti Kan were among the contributors to ID3v2 (Nilsson, 2007) though they were hesitant to get involved with anything associated with mp3s (Howison & Goodrum, 2004, p. 12)— they were linked by virtue of the similarity of the service they provided and by unstable state of music on computers.

The frames and fields of the CDDB and ID3 tags are a series of culturally inflected categories and attributes that are not only tied to technology, but to the social setting in which digital music evolved. Rock, electronic, pop and hip-hop were among the most prevalent genres in the digital music sphere. The majority of mp3s that needed metadata or CDs that got looked up on the CDDB were reflective of the tastes of a certain subset of young, techno-savvy music listeners. CDDB categories and ID3 tags were thus designed with these genres and listeners in mind. Although they were flexible enough to meet the needs of other genres, they were best suited for these particular cases.

Nowhere is this more evident than in the case of classical music. Although sales of classical music in digital format have picked up in the last five years (Shugold, 2005; Tsioulcas, 2007), classical music's initial move online was slower than other genres (Gracenote, 2007; Singer, 2007). While this is certainly attributable to the demographics of classical music listeners or the genre's staunch tradition of audiophilia — though I am hesitant to put too much weight on these kinds of stereotypes — classical music in its digital form faces some fundamental challenges that do not apply to other genres. Metadata, despite its flexibility and expandability, was not designed with classical music in mind. As a business development manager of Naxos, a leading independent classical music label, notes: "Classical music metadata has been a problem for music labels and publishers, retailers and certainly music fans since digital music was first developed, and we have greatly needed a viable option for displaying classical music in an easy and consistent manner" (qtd. in Gracenote, 2007). While sorting music by artist, by album or by song title is adequate for pop, hip hop, electronica or rock, fans of classical music require fields like "composer", "conductor", "orchestra", "soloist" to make sense of their songs (S. Brown, 2008). The length and format of classical music "songs" also poses problems: How, for example, should users sort movements or suites from the same piece? How can users distinguish between multiple performances of the same piece by different orchestras? Users with a library full of multiple versions of "Symphony No. 7 in D Minor" need added mechanisms for finding the piece they want to play.

These are just some of the issues that confounded classical music users trying to sort and play their digital collections on computers. Jazz fans voice similar complaints about the bias inherent in metadata (Bremser, 2004). They describe the difficulties of trying to include all of an album's session musicians and the problems presented by re-issues with different release or record dates (Bremser, 2004). Gradually, iTunes and other media players have improved their metadata capabilities for niche genres (e.g. iTunes included a "composer" category in 2004). There are also a growing number of stores and other online resources that cater to this market (Tsioulcas, 2007). The CDDB even launched a "Classical Music Initiative" in 2007 that focused on displaying complete and consistent classical metadata across a wide range of devices (Gracenote, 2007). Still, the difficulty metadata posed for some early listeners highlights the problems that arise when databases and tags built for certain resources start accommodating objects that require different kinds of sorting strategies. As one user noted on his website, it was necessary to "Tame iTunes for Classical Music" (S. Brown, 2008). Metadata made music behave a certain way that affected the usability of digital music.

Regardless of genre, most users have undoubtedly run into the limits of metadata. Whether it's a band that has multiple potential spellings (Iron and Wine vs. Iron & Wine) or a compilation album featuring multiple artists, these minor details can cause major issues when trying to locate and playback music. The problem is only compounded by the mobility of the digital music commodity. Nick Wingfield (2005), writing for the Wall Street Journal, describes this frustration accurately. After importing a compilation CD called *The Cosmic Game* he realized that when he searched his library by artist, the album never appeared all in one place. Instead of displaying the whole album at once, his software showed thirteen individual songs, each one by a different artist. The same sorting anomaly happened when he transferred the album to his portable player. He fixed the problem by browsing by album, instead of by artist, but even then, issues arose. Because *The Cosmic Game* begins with "The", it was buried amongst dozens of other albums he had beginning with the common article. The example keenly illustrates how minor variations in spellings or in the sorting eccentricities of different media players can delay or confuse the process of users accessing and using their music. Metadata are an imprecise art, and the way they describes music prescribes how users experience their music.

Metadata, then, are a kind of packaging that cover digital files in a layer of highly specific attributes; an interface through which listeners interact with, label, sort and handle their music. Embedded and networked into the very files themselves, ID3 tags and CDDB data give shape to the digital music commodity and enhance its micromaterial qualities. While some music enthusiasts argue digital files are "just data, metadata, and a thumbnail" and therefore inherently less valuable than its tactile counterparts (McCourt, 2005, p. 250), metadata embeds the music commodity with different kinds of value. It is not so much a question about whether metadata offer the same kind of fetish opportunities as, for example, the sleeve of a vinyl album. Metadata package music with a look that we recognize (i.e. album covers, song titles, etc.) and provide it with a functionality we understand (i.e. I want to play song X from album Y). They rehabilitate music's emotive context in its new medium, with features that are specifically useful for that medium. Metadata are what turn a hard drive full of data into a personalized, customized, dynamic collection of music.

Metadata let users add ratings to their music, track how many times a song has been played, how recently a song has been played, and tag tunes with other commentary. Advanced metadata make digital music libraries searchable not just alphabetically or by date, but by multiple, customizable variables (tempo, favourites, mood, etc.). Users with a richly tagged library can even delegate the task of music selection to the computer itself. Software players can automatically generate playlists and other user-specified groupings based on tag information. When we can sort digital music in these ways, it starts to act like music we could build a collection with. When we can organize songs into temporally, spatially, or behaviourally distinct playlists, we can create new histories around them; ones not based on the wear and tear of album covers or scratches on a disc, but ones still intimately tied to use and meaning. The act of extracting audio from a CD may strip music from its original context and leave it bare in a new environment, but metadata ensure digital music files will never be immaterial. They re-contextualize music's materiality, embedding familiar attributes of the music commodity while at the same time suggesting new uses. All of this is possible because of the way metadata links and organizes digital files. This is not to suggest that people buy digital music for its metadata. Rather, they buy digital music because of what they can do with music in that format, and much of that functionality depends on metadata.

MAKING TECHNOLOGY BEHAVE

The electronics manufacturer that first bought the CDDB in 1998 was Escient LLC, the same company behind the TuneBase 2000. Escient's purchase of the database, while upsetting to some users, was hardly surprising from a business perspective. By 1997, the metadata the TuneBase 2000 served up came from the original CDDB. Had another company purchased the CDDB and cut off access to it, Escient could have been left without the content it depended on for its devices: "[CEO Scott] Jones […] recognized that we were the only game in town for CD recognition. He was hot to acquire CDDB to ensure that it wouldn't disappear on him" (Scherf qtd. in Van Buskirk, 2006). The CDDB acquisition was part of Escient's overall strategy to "make technology behave". Like the TuneBase 2000, they hoped the CDDB would bring order to our music collections. In a kind of reverse perversion of Illich's (1973) idea of conviviality, Escient's motto suggested technologies should act simple, even if they were not.

Escient's tagline, however, is also a useful frame for understanding the larger role metadata play in the commodification of digital music. Metadata are not just data about data. They are data that describe an object *and* data that serve some broader purpose for that object. They underpin the everyday practices of digital music and present digital music as a commodifiable object. More importantly, while metadata appear to provide primarily functional attributes (i.e. helping users sort, locate, retrieve, and use resources more effectively and efficiently), they link resource to a wider network of goods and practices. They connect one bit of information to the rest of the infosphere.

This is a key aspect of digital metadata. They amplify the importance of a resource's extra-textual elements. In an "information economy", information is both an end commodity and a resource that enhances the value of other commodities (Poster, 1990; Schiller, 2007). This is what Vincent Mosco (1996, p. 151) or Mark Andrejevic (2007, p. 3) refers to as *cybernetic commodities*. Cybernetic commodities are those that are valuable both as commodities and as objects that produce information that can be further commodified. Mosco (1996) uses the examples of television ratings, loyalty cards, and database marketing techniques that match consumer purchases to demographic information. He argues "these practices are part of the commodification process because the information they produce is used in the production of commodities like newspapers or television situation comedies, and are cybernetic because the outcome of the information production process is the production of a new commodity" (Mosco, 1996, p. 151). Cybernetic commodities have a secondary order of exchange value that depends on a first order; it is not just the commodity itself that is valuable but also the knowledge of who needs it, who supplies it and what it does (Mosco, 1996, p. 151). As Mark Poster (1990) notes, this creates an information loop where "one database (product information) generates another database (consumer information) which generates another database (demand information) which feeds the production process" (p. 75). New media technologies lend themselves this kind of feedback and to the generation of cybernetic commodities (Andrejevic, 2007, p. 3). Metadata, then, are not simply tools to organize and access music amidst expanding digital collections. They are simultaneously part of the digital music commodity and about it.

With CDDB under its roof, Escient — an awkward neologism for the "science between entertainment and technology" (Scott Jones, 2009) — set about mining its new cybernetic commodity. The database supplanted TuneBase as the company's key resource and Escient started licensing the database to glean a "number of new revenue streams" from it (O'Malley, 1998). A host of then-emerging software programs like Nullsoft, MusicMatch Jukebox, Microsoft Media Player and other technology companies were already using the service and Escient realized they could profit significantly from seeding the database into other similar products. In 2000, CDDB was spun off into its own standalone private company and renamed Gracenote CDDB. Gracenote acquired and/or developed key patents "concerning the delivery of metadata and song information to music playback devices or online applications"(Gracenote, 2001a). They also partnered with a series of other technology companies (CDDB, 1999a, 2000) and established one of the first digital music "countdowns" and tracking services (Gracenote, 2001e). As they grew, they added more sophisticated kinds of recognition technology; instead of using the TOC data to match CDs, Gracenote started identifying songs by using waveforms, sonic cues and other kinds of audio fingerprinting (K. Dean, 2004; Palenchar, 2002).

During this time, Gracenote used the database to pursue a particular path for the development of digital music. While many record labels looked skeptically at anything digital (e.g. early Winamp, MP3.com, Napster), Gracenote was actively working to show major record labels how they could use and benefit from the information generated by digital music. Take the example of the *Bowie at the Beeb* CD Gracenote helped design in 2000. Under the direction of chief technology officer Ty

Roberts[10], the Bowie CD featured Gracenote's CD-Key technology. When users inserted the disc into computers, CD-Key identified the disc as a legitimate copy and linked users to a site where they could download exclusive extra content. Shortly after this industry first (Gracenote, 2000a), Grammy-nominated guitarist Reeves Gabrels signed a one-year exclusive deal with CDDB where a link to Gabrels' website would be provided to users who played certain songs or CDs – a David Bowie track, for example (CDDB, 1999b). These initiatives, and similar ones for artists like Geddy Lee, highlighted Gracenote's desire to enhance the CD commodity by linking metadata to multimedia content (Gracenote, 2000b).

In some ways then, the CDDB reinforces the importance of the CD commodity. As much as it contributed to the shape of the digital music commodity on computers, the CDDB's reliance on CD technology meant that it had one foot firmly in the past. The CDDB was a transition technology, but the initiatives the owners pursed under Gracenote's direction were geared towards ensuring the relevance and value of the CD as a commodity form. A clear yet subtle example of this is the way the CDDB handles mixed CDs. The database does not work very well, if at all, for mixes. Because much of the recognition technology relies on the TOC listings, a user-generated mix causes trouble for the software. The CDDB does not label the songs on a mixed CD properly; it does not make it easy for users to sort and it does not provide other extra-textual information like album art. The CDDB seems to afford a lesser status to mixed CDs than to official ones. The CDDB helps

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[10] Before working at Gracenote, Roberts was owner of a multimedia/CD-ROM development company called ION. Much of the "enhanced content" he developed at ION was specifically designed for record labels looking to transition CDs to computers on their own terms. Roberts also sat on an RIAA technical sub-committee (CDDB, 1999e) and was likely sympathetic to (or at least aware of) the RIAA's push against piracy.

perpetuate an old way of seeing the music commodity even as it makes digital music more visible on the computer.

The CDDB also helped the record labels and CD manufacturers in other ways. Gracenote put their recognition technologies in service of more than just fill in missing metadata. Increasingly, Gracenote was using the CDDB not only to provide information to users but also to provide information to producers, labels and manufacturers. With hundreds of users connecting to the service each time they inserted a CD into their computers, Gracenote had rich data for record labels on which CDs were popular (i.e. which ones were getting the most requests for metadata). They also tracked how the bonus content on CDDB enabled CDs were being used, helping record labels hone their multimedia marketing campaigns. Gradually, Gracenote was transforming the CDDB from a user-generated database for facilitating the playback of CDs in computers to a massive information repository that stored precious data on the listening habits and tastes of a valuable audience. By 2001, Gracenote was working with close to 4,000 partners worldwide, servicing more than one million consumers daily, and managing over 13 million songs in their database (Gracenote, 2001c).

As the fight over online piracy, file sharing, and Napster heated up, Gracenote also found other uses for its recognition expertise. After Napster's court injunction in 2001, Napster faced the monstrous task of removing all copyrighted material from its service (Boulton, 2001). Gracenote partnered with the beleaguered file sharing service to help them weed out unauthorized tracks from their network. Although the labels had supplied Napster with a long list of songs to remove, many of the files were spelled incorrectly or had variant labels (e.g. Boys 2 Men vs. Boys

To Men vs. Boys II Men). CDDB's recognition technology logged many of these multiple variants in an effort to maintain database accuracy. By matching CDDB's variant list with the ID3 tags and other metadata information on the network, Napster was able to filter through the server even further (Gracenote, 2001d). After this experiment, Gracenote continued to develop technologies for tracking files found on peer-to-peer networks, for the purposes of providing metadata and facilitating rights payments (Gracenote, 2001c). By 2004, helping companies identify copyright infringement in online spaces was quietly becoming part of the company's mandate (K. Dean, 2004). In exploring these kinds of initiatives, Gracenote was expressing a certain vision for the future of digital music, one built on trying to authenticate legitimate music purchases and enhancing the content on the CD commodity. They were using a moment of technological change to extend their control over the music product. This control was written into the database and the metadata that constituted it. Technologies like CD-Key and Audio Fingerprinting were as much means of serving metadata and bonus content as they were a means of encouraging the purchase of a legitimate CD.

Much of the literature on databases in the information economy in communication and cultural studies draws on Michel Foucault and focuses on the idea of surveillance (see for e.g. Andrejevic, 2007, p. 106; Poster, 1990, p. 69). Databases, for Poster, contribute to a SuperPanopticon: a system of mass surveillance that silently tracks the "transactions of everyday life" to create all kinds of market, health and leisure profiles on citizens (Poster, 1990, p. 69-98; Poster & Aronowitz, 2001, p. 43). They evidence a kind of participatory surveillance in which consumers willingly share their personal information as a condition of use of certain new technologies (Andrejevic, 2007; Poster, 1990). The evolution of Gracenote's services certainly lends itself to this kind of interpretation. By the time Sony Corporation acquired Gracenote in June 2008, the company boasted over 250 million customers worldwide in over 80 languages (Gracenote, 2008). The database powers players like Apple iTunes, Yahoo! Music Jukebox, and Winamp, and it is "featured in millions of car stereos, tens of millions of mobile phones and media players, and hundreds of millions of consumer electronics devices around the world" (Gracenote, 2008). They have also branched out into digital music tracking services, automated playlist creation, and video recognition for DVDs (Gracenote, 2008). A true cybernetic commodity, user contributions to the database provide Gracenote with insights into the listening and surfing behaviours of millions of users.

Without denying the necessity of such an avenue for analysis, I am more interested in the database's impact on the form and use of the music commodity. By weaving digital music into a larger network of information and devices, the CDDB and ID3 tags amplify the informational aspects of the music commodity. They expand the scope of the music commodity by linking our collections to a broader field of goods and services. The latest crop of metadata-related technologies, for example, are all premised on the connections metadata can make, either within our own libraries or to outside databases. As I write this in 2010, there is a host of new recommendation engines based on metadata emerging (e.g. Gracenote's Discovery service, Pandora, the iTunes Genius Playlist, and music-based social network sites like LastFM). Used at a local level, these services trace out similarities between files in individual libraries and help users re-discover music already in their collections. They make evident aesthetic connections between sounds and songs that users may have previously seen as distinct. On a wider scale recommendation technologies plug users into the vast repository of commodities on the Internet and make suggestions for further listening or purchase. If a user is playing a song by, say, Texas-based instrumental rock band Explosions in the Sky, recommendation engines can not only tell users that they might also like Lymbyc System (another Texas-based instrumental band) or Do Make Say Think (a Canadian band in the same genre), they can also direct users to check out a DVD of Friday Night Lights, a football film with a soundtrack that features the music of Explosions in the Sky. Scenarios like these are becoming increasingly common on a wide range of platforms. They extend the reach of our music files, both within our libraries and to other commodities beyond it. Although they rely on algorithms and databases of user preferences, metadata are the keystone technologies that make establishing these connections possible in the first place. As more and more commodities get embedded with metadata, they are all linked through their information.

Metadata are part of an ongoing process of the commodification of culture and the informationalization of the cultural commodity (Schiller, 2007, p. 101). However, the embedded and networked nature of metadata presents some instability for the music commodity. Whereas data used to be part of music's packaging, metadata are now integrated in the media and networked to databases outside of the product. As an embedded property of digital music, metadata influence how we search and sort our digital files. But metadata's networked nature also means that the information that constitutes our libraries comes from a source outside our collections. The CDDB feeds metadata to users each time they call it up. Record labels or artists may have generated that information, but it may also have come from users. This has repercussions for how artists and songs get classified. Users may categorize an album as Rock or Alternative even if an artist sees themselves as Indie or Folk. The distinction may appear minor, but if other users are searching for music based on genre, it has implications for how artists are discovered.

As a result, databases like the CDDB act on our collections from afar. Incorrect metadata — mislabeled by well-intentioned users or never properly labeled in the first place — can and do find their way into our libraries. Dates can be wrong, names can be misspelled, and albums can be categorized in genres that make little sense. Since much of the data fetching and feeding process is automated, it is easy for such inaccuracies to propagate. Anyone who has ever used Winamp or iTunes to automatically download album art and metadata will be familiar with how frequently songs get embedded with incorrect or incomplete graphics and album information. The persistence of incorrect metadata has spawned a secondary market of software programs like FixTunes, MediaMonkey, Music Brainz, and TuneUp that help users clean up their messy metadata by automating the process of searching for, adding, and correcting metadata. These metadata reconstruction programs condense and expose a process that is continually occurring with digital music: software fetches information from databases that colours and codes the look and shape of our digital collections. They are a reminder that since the metadata of our digital music often resides in online databases, data for the digital music commodity takes on a life of its own. Separated from the commodity, it becomes a new thing that can change independently of the product with which it was once attached. In doing so, it can alter the attributes and meaning of product itself.

Metadata for digital files were not a given. Although metadata can be seen as the next iteration in a line of information that has long accompanied and conditioned the experience of music, it still needed to be reconceived for digital environments. Album art, liner notes, track names, production credits and the like all contributed to the shape of the music commodity over the last century. It is not surprising then as metadata in the digital domain developed; it strove to serve these same functions. The evolution of the CDDB, ID3 tags and metadata more generally was the result of conscious decisions to re-embed the music format with information from its previous format, and to present it in ways that seemed new and novel. Whereas information was previously "inseparable from the 'packages' in which it was delivered and the package had a price tag" (Poster, 1990, p. 73), the package was now made up of layers of information that were embedded or networked into the commodity. Metadata now acts as the cover, the case and the liner notes. It leads us to music, tells us about it, describes how fast or slow it is, how much other people liked it and how much we liked it last time we listened to it. Metadata ties together disparate songs in our collections and points us out towards a whole world of sonic links and other commodities. Without metadata — and the other aspects of digital music's interface discussed in this dissertation — digital music is just data; just sound created from bits and bytes. This sound is very powerful data and I do not wish to diminish its importance. But it takes the work of metadata to give music the context necessary for collecting it, using it, and interacting with it.

As users put CDs into devices like the computer or ripped discs into their component songs, they shed the descriptive skin of music's packaging. In the absence of this information, users and companies co-developed technologies to recreate that information for digital files. Built and expanded by users, the CDDB and ID3 tags were not solely an industrial effort. Users were partly responsible for the functions metadata provided and the ways in which the technology functioned. As such, users were also partly responsible for the commodification of the digital music commodity. ID3 tags and the CDDB not only helped users organize and sort their music in ways that were both familiar and useful, but they also advanced an idea of what music on computers should look and act like. Metadata gave digital music files a name and a look. They re-envisioned music's materiality. They made digital music behave like a commodity.

CHAPTER 3 – THIS BUSINESS OF NAPSTER

NAPSTER AND ITS OFFSPRING

In the summer of 2000, Napster — the company that produced the eponymous music file-sharing program — found itself in a bit of a conundrum. No, it was not that high profile musicians like rock group Metallica or hip hop producer Dr. Dre had launched lawsuits against the service for copyright infringement and racketeering (Menn, 2003, p. 141). Nor was it that a U.S. District Court judge had just ordered Napster to shut down. This particular dilemma was much smaller in scale, but it put Napster in the awkward position of having to admit to itself, publicly, what role it was playing in the development of music as a digital file. On Jun. 1, 2000, pop-punk pranksters The Offspring started selling Napster-branded merchandise on their website (Lash, 2000b; Menn, 2003, p. 137; Segal, 2000). Baseball hats, T-Shirts and stickers were available, all proudly displaying Napster's now iconic logo: a stylized cat face wearing headphones and a mischievous smirk (King, 2000b; Lash, 2000b). Like much of the music on Napster's network, the merchandise could be considered bootlegged. The Offspring had not asked permission to use Napster's logo or sell its merchandise and the profits from the sales were to flow directly to the Offspring (King, 2000b; Lash, 2000b). The band's prank, though serious, was good-natured at heart. It was as much about sustaining the Offspring's image as it was about revenue or revenge: "It isn't about making money. In typical Offspring fashion, they think it's funny to fuck with people. They think Napster's cool and want to see how cool they [really] are" (source close to the band, qtd. in Lash, 2000b). Part jest, part exercise in one-upsmanship, the Offspring wanted to see how Napster liked the taste of its own medicine: "It's all fair. We've already said you guys [can use] our stuff — we're gonna do yours, too. You shouldn't have any problem with that, should you?" (Offspring source qtd. in Manciniwith, 2000)

A day later, Napster reacted in a manner that was decidedly uncool: they sent a cease and desist order (Lash, 2000a). Chris Phenner, Napster's Business Development Manager at the time, reportedly contacted the Offspring via email: "We noticed the sale of Napster-related merchandise on the Offspring.com site, and wanted to ask for the removal of all offers relating to the sales of our merchandise. I [...] wanted to thank you in advance for your compliance in this matter" (Lash, 2000a). Even though not everyone at Napster thought this was the best course of action (Menn, 2003, p. 137), Napster had little choice. The problem was that if Napster knew of someone else using their logo and trademark and did not attempt to actively prevent it, they could have lost their right to defend the brand elsewhere (King, 2000b; Menn, 2003, p. 137). As one entertainment lawyer noted: "Napster can't 'be cool' because they are required to defend their trademark as a matter of law" (qtd. in King, 2000b).

Slightly surprised, The Offspring took the weekend to consider its next move (Lash, 2000a). After all, the band was a fan of the software and had publicly supported file-sharing and Napster via statements posted on their website: "MP3 technology and programs such as Napster [are] a vital and necessary means to promote music and foster better relationships with our fans" (Menn, 2003, p. 137). Their prank may have been rooted in a small annoyance that Napster was making their songs available for free, but they certainly did not want to be one of Napster's enemies (Menn, 2003, p. 137). After some back and forth discussion – and some significant mocking of Napster from the press/Internet music communities – the two parties resolved the situation amicably. On June 5, Napster apologized for the heavy-handed letter and agreed to work with the band to sell official Napster merchandise from The Offspring's store ("Napster Teams Up", 2000; Segal, 2000). All proceeds from the sales would go to charity ("Napster Teams Up", 2000).

This half-hearted controversy makes visible an image of Napster that is often overlooked: Napster as a company, as Napster Inc. In typical narratives, Napster is either demonized by the major record labels and industry bodies like the RIAA or IFPI for unleashing a Pandora's box of illegal file swapping or lionized by users, techies and cyber-libertarians for ushering in a new era of music discovery and listening. The tiff between Napster and the Offspring puts both these opposing views in check. Here was a piece of software accused of pirating the music of thousands of bands accusing a band of piracy. Here was a potentially law-breaking idea appealing to the rule of law. Considering Napster's counter-cultural and anti-commercial overtones, how could it exist as a rogue piece of software *and* still send a cease and desist order? The answer, of course, is because Napster was a business. Like other companies striving for success in the booming dot-com economy, it had a corporate structure, venture capitalist investors, Business Development Managers and lawyers. It had a brand, a logo, and trademarks it needed to protect. It even hoped to be profitable one day, primarily through mining the value latent in its community of users. From before the software was officially released to its final days, Napster Inc. was actively trying to establish itself as a key player in the music and technology industries.

This chapter looks at Napster's business plans, its software, and the discourse around its user base to explore the program's impact on the commodification of digital music. Throughout, I follow two avenues of inquiry. The first is the role Napster played in creating a viable online music market. Napster gathered and organized an audience that made the idea of digital music retail more than just a bubble beneath the surface. Through its interface and website Napster enabled a commodity community, a network of connected consumers, all trading in mobile digital goods. Participation in the network was as "free" as the music it held, but Napster Inc. (and others) extracted value from the programs' users based on the kind of community they represented. Napster was a kind of digital enclosure (Andrejevic, 2007, p. 2) and user participation with Napster's technology came with certain trade-offs (McCourt & Burkart, 2003). Napster's audience generated a feedback loop of valuable information for those looking in on the system. Secondly, this chapter addresses how Napster and its audience helped shape the form of the digital music commodity more broadly. Napster's interface connected users in novel ways and presented them with a particular vision of digital files. It played up the social and technical features of music listening and placed a heightened value on the moment of distribution and the environments through which music circulates (S. Jones, 2000b, 2002). Napster's interface, its never-fully-realized business model, and its idea of community became the template on which subsequent file-sharing programs and other social media were built. Despite its potential to help users skirt the regular chain of economic transactions involved with acquiring music, Napster actually helped shape the form of the digital music commodity more than it contributed to its undoing.

ORGANIZING AUDIENCES

It may seem counter-intuitive that the program that the major record labels have so vilified as the culprit for declining revenues from music is actually one of the prime reasons why a market for digital music commodities exists in the first place. For as much as Napster is chided for giving users unprecedented access to "free" music, it was also essential in organizing an audience for digital music. Napster brought together a sizeable enough group of users to make the idea of digital music retail seem realizable. As a business, Napster planned explicitly on profiting from this user base; other companies in the music and technology industries did as well. Even though Napster may have seemed antithetical to traditional forms of commerce, its own business model was surprisingly similar to that of other media companies that gather an audience for the purpose of selling it. Napster's conception of its users, the Napster software and website, and discourses about Napster users from the press, academics, the courts, record labels and other music and technology companies combined to construct a hybrid collectivity that was a fusion of audience and community. Individual Napster users became a unified body of spectators, listeners and participants that could serve legal or commercial ends. Napster provided a space for an audience that engaged in community-like behaviour and initiatives, but one that was nonetheless built to be a commodity and to generate data, information, patterns or behaviours that could be sold or used in other ways by the community's creators.

As with Winamp and the CDDB, Napster began as a hobby project. In 1998, while at Northeastern University in Boston, Shawn Fanning started working on a program to facilitate finding mp3 files online (Ante, 2000b; Hartley, 2009b). By

January of 1999, Shawn had dropped out of school and was working on the program full time with his uncle, John Fanning (Ante, 2000b). In May, John incorporated Napster while Shawn finished the beta version of the software. The program spread quickly through the summer and the fall of 1999 drawing the attention of the RIAA (Sullivan, 1999b), which launched a lawsuit against Napster in November. Prominent musicians started filing charges of their own against Napster and its users in early 2000. The legal battles ensued for several years. Napster was ordered to shut down in July 2001 but another court stayed that ruling, allowing Napster to remain in operation during the appeal process. As a last gasp, Napster began talks with German media conglomerate Bertelsmann (BMG) but, in early 2001, Napster was ordered to filter all copyrighted files out of its network (Borland, 2002a). The company filed for bankruptcy in June 2002 (Borland, 2002a). After a judge blocked Napster’s sale to BMG, a company called Roxio that manufactures CD-burning software paid $5 million for the Napster brand, logo and patent portfolio in an assets fire sale (Borland, 2002b). Roxio turned Napster into a viable though relatively unsuccessful subscription service ("Retailer Best Buy" 2008; Van Buskirk, 2008a). In 2008, Best Buy purchased the beleaguered service for $121 million ("Retailer Best Buy" 2008).

Napster’s user-base fluctuated during this saga though its rapid growth caught many people — its creators included — by surprise (Varanini, 2000). In June 1999, Shawn Fanning initially shared the program with only a handful of friends (Ante, 2000b; Beuscart, 2005). Some of these users began discussing the program on public Usenet groups and attracted more users in the process (Beuscart, 2005). Download.com, a popular website for software reviews and downloads, featured the program in August and by October, Napster had approximately 150,000 registered users, with about 22,000 of those users on the system simultaneously (Menn, 2003, p. 101; Spitz & Hunter, 2005, p. 171). Estimates vary, but just 6 months after going live, Napster had somewhere between 2 million and 10 million users (Giesler & Pohlmann, 2003b; Hartley, 2009b) and websites/publications like *Webnoize*, MP3.com and *Wired* were writing about it (Reece, 1999; Sullivan, 1999a). The added attention from the court cases later in the year brought the program more users, which brought more press attention, which in turn brought even more users.[11] Some researchers claim the service had up to 70 - 80 million users exchanging billions of files at its peak (Logie, 2006, p. 5; B. C. Taylor, et al., 2002, p. 610), though a more modest count of 30 to 40 million users is likely more accurate (L. Robinson & Halle, 2002, p. 378). Although these metrics now seem normal for online networks like MySpace, Facebook or Twitter, they were relatively unmatched at the time.

The quantitative growth of Napster's user base is less interesting than the qualitative issues it raises about notions of audience and community, particularly with respect to new media and online collectivities. Dallas Smythe (1981), in one of the most enduring works on media audiences, famously argued that media produce an audience commodity. Speaking specifically of broadcast media, Smythe noted that TV programs are the free lunch broadcasters and advertisers give out in return for audience labour. As viewers view, they are at work. They are being produced as commodities that broadcasters sell to advertisers: "The work which audience members perform for the advertiser to whom they have been sold is learning to buy

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[11] As a quick indicator, a search of the Factiva news database from 1999 - 2000 reveals only five mentions of Napster, whereas the same search during the next year, 2000-2001 reveals almost 6,000 mentions, and another 6,000 the following year.

goods and spend their income accordingly" (Smythe, 1981, p. 266). New media seem to extend and complicate this logic. There are, for example, a host of media or software applications whose audiences gather not just to consume but to produce. As part of the rise of "Web 2.0" (O'Reilly, 2005), there has been an explosion of "social media" sites and services (as if any medium could somehow not be social) that make user participation and user-generated content a key part of their offerings. Instead of passive recipients of media, users are "prosumers" or "produsers" who make and take content almost simultaneously through social networking sites, blogs, and the like (Andrejevic, 2007, p. 29). As noted in the previous chapter, users of these kinds of programs — from the CDDB to MySpace or Facebook — perform a different kind of labour than Smythe's typical audience commodity since they willingly offer up a significant amount of the content that makes these sites run (Coté & Pybus, 2007; Terranova, 2004). Napster was an early version of exactly this kind of service. It allowed users to connect, to find content and make it available for others. Napster helped users insert themselves into the production, reproduction and distribution cycle of the music commodity. Whereas in Smythe's model, the "free lunch" was the content viewers received, Napster, Facebook, MySpace and other social media offer users platforms upon which they can create their own content. The audience is doubly at work, producing the very content it consumes. More interestingly for the case of Napster, the work the audience performed seemed to undermine, or at least trouble, the traditional economics of production, distribution and consumption.

New media and the Internet not only make possible different ways of assembling audiences and putting them to work, they also allow for different means of measuring and representing them. There are more tools than ever for advertisers or producers wanting to track consumer behaviour and predict audiences. This leads to both a more accurate and a more distorted picture of what the audience is and how it gets represented. Philip Napoli (2001, p. 66) notes that any audience is a balance between the predicted (i.e. forecasts that are made about the audience's size/behaviour), the measured (i.e. what ratings firms provide) and the actual (i.e. everyone who is actually an audience member for a given media product, an essentially unknowable detail). Since companies value predictability, Napoli notes that the value of certain new media audiences may increase or decrease depending on how predictable they are. In other words, the easier certain audiences are to measure and predict, the more valuable they become (Napoli, 2001, p. 68). Firms that are convincingly able to predict audiences will be better positioned to exploit that audience.

Napoli's argument is a reminder of Eileen Meehan's (2001) insightful critique of Smythe's audience commodity (for more critiques of Smythe, see also Garnham, 2001; Murdock, 1978). In her study of the ratings firm ACNielsen, Meehan (2001) argues that the audience is "knowable only through the ratings that measured it and those ratings were the outcome of corporate rivalries, alliances, and manipulations" (p. 214). Meehan contends that ACNielsen and other ratings companies created a partial — not to mention highly gendered — version of what constituted the television audience; one that would appeal to the companies who relied on that information (p. 215). For Meehan, the audience commodity actually had little to do with the people who actually watched television. Rather, they were a figment of measurement used to convince networks and advertisers of the desirability of their audiences (Meehan, 2001, p. 215). As with previous audience measurement tools, new media methods of gauging the audience come with their own limitations and blind spots. The diffuse nature of measuring new media audiences, however, compounds the task. Measurement firms still face difficulties reconciling the packaged, sellable version of the audience with the actual audience. As the gap between the measured audience and the actual audience widens, the value of the audience product decreases, at least for producers and advertisers (Napoli, 2001, p. 71). According to Napoli (2001), the difficulty of judging the economic worth of the audience commodity in new media contexts means that, in addition to advertiser-supported media, new media content producers will be looking to find other ways to extract value from users, "such as audience members' personal data, research services, and various cross-promotional opportunities" (p. 71). New media producers will increasingly rely on cybernetic commodities, on the ability to sell data *about* our use of entertainment commodities rather than the sale of those commodities directly (Andrejevic, 2007, p. 14; Mosco, 1996, p. 151). The act of "being watched" will become as valuable as watching advertisements used to be (Andrejevic, 2007, p. 14).

Meehan and Napoli both circle around a similar insight: all audiences are in a sense constructed. Measurement technologies are quantitative constructions of audiences. But press coverage and other social discourses about media also create representations of users. This was certainly the case with Napster (see for e.g. the research on press coverage and audience construction from Logie, 2006; Spitz & Hunter, 2005; B. C. Taylor, et al., 2002; Woodworth, 2004). Much of the discourse around the software was loaded with heated rhetoric that either elevated Napster users to revolutionary status or disparaged them as an underground network of thieves. Research has shown that many journalists were quick to label Napster's audience as young and deviant pirates (Spitz & Hunter, 2005; B. C. Taylor, et al., 2002) even though there were several indications that Napster's software was not limited to students or the under 20 set (S. Jones & Lenhart, 2004; Mann, 2000, p. 57; B. C. Taylor, et al., 2002, p. 615-616). Press coverage and court documents consistently applied labels like "teens" and "undergrads" to signify all Napster and "'adolescent' served as a metonym for Napster users as a whole" (Spitz & Hunter, 2005, p. 173). Depending on the story and on who was telling it, these young users were "wholly integrated members of society ("music fans"), external threats ("pirates"), or both" (Spitz & Hunter, 2005, p. 173). The press discourse and that of the RIAA shifted between the use of the terms "users" and "pirates" whenever it suited them, defining the latter in a "purposefully vague" way as part of a negative image campaign against Napster's audience (Spitz & Hunter, 2005, p. 173, p. 172-175).

The discourse that surrounded Napster users makes it clear they were more than just an audience. They were an online community; a group that bonded as they engaged in digital exchange (Giesler & Pohlmann, 2003a; Poblocki, 2001). Kacper Poblocki (2001) argues that Napster was simultaneously an imagined and networked community. Like other forms of imagined community (B. Anderson, 1991), Napster users were highly dispersed and had limited interaction with other users. It was an activity-based community rather than one grounded in belief (Poblocki, 2001, p. 4). However, it also shared characteristics of networked communities (Wellman, 1999) since it was built on specialized loose ties; it had a frequently changing membership; and its members had little perception of the attributes, way of life, and historical experiences of other users (Poblocki, 2001, p. 5). Users in these kinds of virtual social groups could imagine other members of the community "*only* thanks to [a] shared mass medium" (Poblocki, 2001, p. 4). Each user's conception of others on the network and ultimately themselves depends in large part on the image of other users that Napster created (an image I explore further when I discuss Napster's interface).

Part of what drew the Napster community together was their illicit or anti-corporate behaviour. As Bryan Taylor and colleagues (2002) argue, many Napster users identified with an image of Shawn Fanning as a young tech-savvy "revolutionary" (p. 616). They regularly conflated the creator (i.e. a nineteen year old computer science hacker dropout) with the software (i.e. a program that could distribute copyrighted tracks for "free"). The result was that Napster was not just an application for sharing files, but also a tool of protest "against the rising prices for albums and concert tickets" and the broader regime of intellectual property (p. 616). By "viewing Fanning/Napster as *revolutionary*, users understood this identity to involve fundamental social change oriented to justice and equality" (B. C. Taylor, et al., 2002, p. 616; Tench, 2001). Users, and not just the younger ones, were caught up in an idea about the software that went far beyond the physical attributes of the program and tied in with a larger vision of computing as devices for personal liberation and self-expression (Friedman, 2005; Turner, 2006).

As a result, the Napster community was frequently held up as an example of a potentially alternate kind of economy (Barbrook, 2002; Giesler & Pohlmann, 2003a; Leyshon, 2003). Barbrook (2002), for example, suggested that "peer-to-peer computing is a direct threat to the economics of the music industry". Napster users and other file sharers were engaging in radical acts of civil disobedience and gift giving, practices that could bring about a "Napsterisation of everything" (Barbrook, 2002). Building websites, making media or open-source software, sharing ideas, files and information may not seem revolutionary or even altruistic on an individual level but "when large numbers of people are engaged in these activities, commercial self-interest is checked by social altruism within the mixed economy of the Net. Before buying information, every sensible person checks whether you can download it for free" (from interview/preface to First Monday's version of Barbrook, 1998). Markus Giesler and Mali Pohlmann (2003a) also saw Napster users as gifters, though they noted the behaviour is parasitic in nature: users are simultaneously donors who host files, receivers who take files, and "troublemakers" who frequently engage in non-reciprocal forms of exchange (p. 8). However, Geisler and Pohlmann recognized that just because the system relied on gifts, users were not entirely excluded from commodity and market systems. Drawing on Robert Kozinets (Kozinets, 2002), they argue that Napster was a transient space, a "temporary hypercommunity" in which to practice divergent social logics (Giesler & Pohlmann, 2003a, p. 9). "Consumer emancipation" — Geisler and Pohlmann's term for consumers seeking to free themselves from market relations — came not necessarily from taking music that one would otherwise pay for, but from using software that was a blatant expression of difference in relation to social norms; in this case, taking music most people pay for (p. 9).

The conception of Napster users as a community of rebellious downloaders is an appealing one. But for all the sociological and cultural interest the Napster community sparked, the program's user-base did not necessarily arise spontaneously around a piece of software. It was planned, managed and cultivated. As much as Napster users were exploring "new forms of social exchanges and cooperation", they were also a "clientele" (Beuscart, 2005, p. S2). Napster users may have been engaging in anti-commercial behaviour by swapping free files but, collectively, they were playing a commercial role by virtue of the fact they gathered around the software. Like traditional audiences for other media products, Napster Inc. saw their users as a way to bring in revenue from advertising and other sources. In this light, Napster's anti-corporate image was as much a marketing move as it was a desire to disrupt the music business. Anti-consumerist ideas and images were put in the service of promoting further consumption (Frank, 1997; Heath, 2005). Nothing sells as well as appearing not to sell. However, rather than a purely political economic audience commodity or some kind of idealized active community, Napster users seemed to be a fusion of the two. I turn now to explore this alternate way to conceptualize Napster's users and to consider the influence they had on the shape of the digital music commodity.

COMMODITY COMMUNITIES

Extrapolating from Christine Fry (1977), Napster is closer to what we might call a commodity community: an audience that is very much a community, but one that was built and maintained as such in order to serve as a commodity. Fry coins the term in an anthropological study about neighbourhoods and residential units (i.e. retirement homes, adult communities, etc.) that are "intentionally planned, designed, and developed as an economic endeavour" (p. 116). In these pre-conceived communities, it is not just the residential units that are being sold, but also the "'way of life', culture, and social organization which is the implicit, if not an explicit part of the deal" (C. Fry, 1977, p. 116). Commodity communities rely on the culture of the community to attract interest, either from other potential group members or those looking to invest in or extract value from it. Through design of the environmental space (e.g. buildings, facilities, parks, etc.) and economic control of resources (e.g. education, recreation, transportation, etc.), community developers must convince potential buyers and sellers of the type of community they hope to create. As such, commodity communities depend on a fairly long term and structural involvement of those managing them (C. Fry, 1977, p. 116). Developers become sponsors or patrons of the communities they create (C. Fry, 1977, p. 116). They are constantly shaping and trimming the community's features in order to enhance its culture and value.

From very early on, the people behind Napster had a vision of the role its users would play. Through its software, website and marketing (broadly put), Napster designed a program that was conducive to a particular community. Creating value and profiting from this community was part of the company's business plan. For example, Joseph Menn (2003) cites an October 1999 strategy document that surfaced during the trial that was written by someone on Napster's management team — the author's exact identity is not in the public record — as evidence. It is a report that outlines the immediate goals of the company: "Progress user base to X# of concurrent users. Get top tier VC [venture capital] funding. Perform tests to determine deal presented to Sony. Do a deal with Sony. Do a deal with other labels under similar terms. Determine whether to become a portal or intermediate infrastructure. Lather. Rinse. Repeat" (qtd. in Menn, 2003, p. 102). The document, though short on specifics and long on irreverence, lays out a linear plan in which each subsequent step hinged on the ability to gather a large number of concurrent users. Only then would Napster be able to acquire seed funding and convince labels they were providing a worthwhile service:

> We use the hook of our existing approach [i.e. free music] to grow our user base, and then use this user base coupled with advanced technology to leverage the record companies into a deal. The fact that we grow 4 or 5 million simultaneous users with millions of songs (through the inherently viral nature of the Napster concept) can hardly be ignored by Sony or EMI. (qtd. in Menn, 2003, p. 102)

Napster's network, for its users and for itself as a business, depended on more users and more files. Although Napster had hopes of "ultimately bypass[ing] the record industry entirely", they knew they could not get by without the major labels: "The key is to co-exist with the record industry, at least temporarily. The record industry is essential to our efforts" (qtd. in Menn, 2003, p. 102). As such, it is not surprising that Napster was discussing partnership possibilities with the RIAA in an attempt to avoid litigation, though how sincerely the two parties engaged remains unclear (Ante, 2000a; Menn, 2003, p. 123; Sullivan, 1999a). Napster continued to believe that the audience it was gathering would be worth enough for the service to flourish, even though John Fanning had apparently received specific legal advice telling him that the business model was almost certainly illegitimate (Menn, 2003, p. 63-71).[12] Twisting the adage "If you build it, they will come", Napster hoped that if they came, it would get built.

Under this strategy, Napster set out to grow its community instead of profiting from it directly. In fact, Napster actively turned down opportunities from

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[12] Menn is highly critical of the influential and, in his view, highly detrimental role played by John Fanning in Napster's history. Menn argues John was a bad businessman who took advantage of his nephew (by giving Shawn only 30% share in the company), scared away would-be investors and set Napster up for an imminent showdown with the RIAA (Menn, 2003, p. 1-2).

some obvious revenue streams. Although Napster's management team had likely discussed the opportunity, they refused to implement a subscription model to charge their users directly (Menn, 2003, p. 101). Neither the Napster software nor the website had explicit advertising, at least as far as screenshots from the Internet Archive can discern (Napster, 1999-2001). They also held off on selling Napster related merchandise, much to the annoyance of Shawn Fanning and the many users requesting such gear (Menn, 2003, p. 138-140). The trepidation was as much legal as it was a lack of organization: Napster was worried that a substantial amount of revenue coming into the company would hurt its chances in court (Menn, 2003, p. 138). This explains why, when Napster eventually reached a deal with the Offspring to co-produce and sell Napster gear, they donated all the proceeds to charity (King, 2000b; Manciniwith, 2000).

Of course, Napster *was* taking in money and this was part of the problem for those who opposed it. In its first summer, John Fanning managed to convince a few business associates to invest $350,000 in the system to build and maintain the infrastructure for a few months (Beuscart, 2005, p. S7). In October 1999, Napster received $2 million from a few wealthy Silicon Valley "angel" investors (Ante, 2000a). Venture capital firm Hummer Winblad contributed another $15 million in May 2000. Although Napster was not profiting from its audience, it was using the promise of that audience as a hook to bring in financing. This level of investment in the company angered labels and artists like Lars Ulrich, the outspoken drummer for Metallica. Ulrich, despite being critically assailed by the mp3 and tech community for his stance against Napster, argued that Napster was not simply a benevolent new technology looking to set music free for listeners, like some digital Robin Hood.

Rather, it was an organization that had serious funding behind it and every intention of being a profitable entity:

> What people have to remember […] is that Napster is a corporation, OK? They just got $15 million in funding from some of the major venture capitalists out here. They have all along, ultimately getting to the point where they could have a major IPO, which is the one option, or get basically bought out by an AOL type of company. So at some point there will be a major, major profit going on for the people who've invested in Napster." (qtd. in Alderman, 2001)

Regardless of where one stood on the question of whether Napster was good or bad for music, Ulrich's point was a reminder that beneath the community was a commodity. If Napster users saw themselves as an oppositional force, Ulrich was asking what exactly it was they were opposing. Indeed, as Napster's legal situation got worse, the $8 million infusion it received from BMG could be seen as exactly the kind of deal Ulrich was predicting.

As plentiful as the press coverage was during Napster's rise to cultural prominence, these mundane details about the business aspects of Napster were rarely discussed (Menn, 2003, p. 2). The idea of Napster as a rebellious, young, and even "revolutionary" technological and cultural innovation (as described in B. C. Taylor, et al., 2002) was so pervasive that the press largely overlooked details about the key players at Napster and their commercialization strategies. While a few articles in business trade magazines and newspapers took an in-depth look at Napster the company (notably Ante, 2000a; Ante, 2000b), Menn's (2003) investigative account reveals how "an astonishing amount of information was never made public" (p. 1) during the early reports on the site/software. The legal and cultural issues the program sparked were of such interest to the media and scholars that they barely touched on what made Napster such a wholly ordinary case of start-up failure during the dot-com boom and bust (Menn, 2003, p. 2). Jodi Dean (2005) argues convincingly that it was only by ignoring Napster's commercial nature that Napster could be heralded as a "sea change", a threat to private property specifically and capitalism more generally (p. 62). Only then could Napster be "a technological fetish onto which all sorts of fantasies of political action are projected" (Dean, 2005, p. 62).

This is where Fry's concept of the commodity community is particularly useful: it helps explain why the commercial aspects of Napster were relegated to the background. She argues that the term community, at least in anthropology and community studies, has long had an organic character to it. Hardly the crass stuff of corporate creations, communities arise from below, from the interactions among people and their environments. Communities can create their own commodities, and carry out any number of commercial enterprises, but social organization itself is rarely considered a sellable or marketable object (C. Fry, 1977, p. 115). This is part of the attraction of the commodity community for those who live there; it feels somehow "natural", a regular state of social organization that allows people to play out their lives and meet their needs (C. Fry, 1977, p. 115). This naturalness is also precisely what appeals to advertisers, marketers or other actors looking to benefit from that community. The more natural it feels, the more natural consumers will act. They will feel less like they are being sold something, less like they are being targeted and marketed to, and more like the social organization they are taking part in is one of their own creation.

As early as Nov. 1999, Eileen Richardson, one of Napster's CEOs, was touting the idea that Napster was, at its core, about community (Sullivan, 1999a).

One of the key sites where this desire to design a community plays out is on Napster's website. Not only was the site the prime location for downloading the application, the site also had plenty of details and messaging geared towards promoting the revolutionary nature of the technology and users of digital music. The website often had explicit mission statements about the program and the company: "Welcome to Napster, the future of music. Napster is the best search engine available, and the best way for users to find and download MP3s. By creating a virtual community, Napster ensures a vast collection of MP3s for download" (Napster, 1999). As the legal battles began, the missives to the users intensified. Napster realized the community they were designing could be a political tool as well as a commercial one. Shawn Fanning and Hank Barry, another of Napster's CEOs, posted updates about the on-going court cases and encouraged users to "speak out" in support of Napster by writing to major record labels and the RIAA (Napster, 2000c). They actively called on artists — "Are you an artist who wants in on the revolution? Click here to get your music heard on the world's largest online music community!" (Napster, 2000a) — and suggested that users "buycott" CDs of musicians that supported the program (i.e. buy the music of bands that spoke highly of Napster or bands that were featured on the site). Napster provided addresses and other location-based tools for users who wanted to mobilize and send letters to record labels or congressional representatives. They also created a forum for users to discuss strategies of resistance and how to stand up for "the future of person to person file-sharing" (Napster, 2000c).

As the court case progressed, the site became increasingly militant. The site's original focus on the software and the music was obscured by pleas for participation:

"We're still going strong but we need your help. Join the Napster Action Network now and make your voice heard. The only way to make a difference is to GET INVOLVED" (Napster, 2001b). Like the rhetoric that underpins Frankel's *MP3 Power! With Winamp* (Frankel, et al., 1999) and the aspirations of the New Communalists (Turner, 2006), Napster saw itself and its users as part of a broader movement. Napster and the computer were more than mere tools; they were means of resistance and self-expression. Napster users could help the cause not just by using the software, but by becoming even more involved in the software's future. They could be part of an uprising that pitted the forces of technology and everyday users against a slow and scared to change industry.

Despite Napster's desire to enlist users as potential allies in their legal struggle, Napster also maintained a distance from its community. In 2000, Napster added a strictly worded copyright policy and a Terms of Use page to the website in an attempt to shift the responsibility of infringing files to its users:

> Napster is an integrated browser and communications system provided by Napster, Inc., […] Napster does not, and cannot, control what content is available to you using the Napster browser. Napster users decide what content to make available to others using the Napster browser, and what content to download. Users are responsible for complying with all applicable federal and state laws […]. (Napster, 2000d)

Additionally, as the partnership with BMG began to make headlines, the company took pains to separate itself from the community. Take this Frequently Asked Question, to which Napster posted a (surprisingly honest) response: "Has Napster Sold Out?: No. We strongly believe that this partnership with Bertelsmann is an important next step for Napster. Napster is a business, and as such, we are taking steps to establish a business model, create value for our users and push the limits of our technology" (Napster, 2000b). The admission of its primary purpose must have been somewhat sobering for users who had believed in the image of Napster as an anti-corporate and rebellious technology. This is not to suggest users were duped. Through the discourse on the site and about the program more generally, Napster users genuinely assumed, and were attracted to, the naturalness of the community. Based on the kind of community Napster had created, it seemed incompatible that they could accept money from the very companies Napster users thought they were opposing.

As Napster's legal leash shortened, the statements to their users on their website became even more antagonistic:

> Napster is continuing to comply with the District Court's injunction and to prevent the record companies from shutting down file sharing. […] we have implemented a range of filters designed to remove from the Napster service all copyrighted works for which we have received notice. We have recently enhanced those filters in an effort to screen out the wide range of variations in artist name and song title […]. While many of the variations in artist and title names are the natural result of individuals naming their own files, some of the variations are deliberate attempts to evade the filters and share material over the Napster service that would otherwise be blocked. Napster's terms of use prohibit the use of evasive measures such as pig latin, napcameback, napsterdecoder and otherwise deliberately altering file names in order to evade Napster's filters. Users found to be employing such evasive techniques will receive a warning and those who continue to share such files will be blocked. (Napster, 2001a)

Users that had once been crucial Napster supporters were now liabilities. Napster was scolding its users for trying to evade their filters, even though users were simply trying to re-embed the program with some of its former capabilities. Napster users came face to face with the idea that their community was far more planned than they had assumed. The service ceased to live up to the expectations users had of it — expectations Napster had set itself.

Napster shut down its website in September 2002. All that remained was a logo and a graffiti-inspired message: Napster Was Here. Even though Napster's relationship with its community was strained at times during the 2-year period the site was online, the company was still hopeful that it could salvage some value from its audience. Before shutting down, they encouraged users to sign up as "public beta testers" of a new version of the program, and to wait patiently while the details of the new service were unveiled (see for e.g. Napster, 2001c). Ultimately, Napster was shut down before it could truly profit (economically) from its commodity community. Still, Napster managed to use the community to its advantage, through public support and activism. After Napster's demise, the community scattered to other file sharing networks and programs (Gnutella, KaZaa, SoulSeek, Limewire), many of which continue to thrive almost a decade later. Most of them rely on features that Napster pioneered and many of them trade in numbers far greater than Napster ever experienced.

Beyond file sharing though, Napster's conception of community has also spread to other services. Napster's technology and template for community opened the door for a multitude of digital web services. The tension that exists between Napster users as a dispersed but connected group exploring new forms of exchange and as a potential source of value presages many of the current popular models of online media interaction. Not only have Napster employees have gone on to work at some of the more prominent web properties (e.g. Sean Parker, a Napster co-founder was also the founding president of Facebook, other employees like Jan Jannink founded music streaming service iMeem), a variety of social networks and other "web 2.0" (O'Reilly, 2005) services see their users in a similar state of balance between community and audience. This is what makes Napster's case so interesting and still relevant to the contemporary moment. Napster was a proto-business that incorporated strategies and features we now see as commonplace in new media. In fact, David Kreps and Erika Pearson (2009) argue that most of the communities that emerge around Web 2.0 and social media services can be considered commodities. Although they do not draw explicitly on Fry's (1977) work, they suggest that venture capital plays a significant role in designing and promoting the structure of social networking sites. The community becomes a commodity as venture capital is directed towards "economically unexploited but pre-existing activities for maximum return on investment" (Kreps & Pearson, 2009, p. 156).

In some ways Napster was rather unoriginal. Napster's business model borrowed from television, radio and other dot-com companies that relied on a "free lunch" to attract new users. However, Napster was one of the first companies to design a piece of technology that realized the size and scale of community that was possible around digital music. It also offered a way of conceiving of collectivities and of managing their affective relationships with a business. Napster cultivated an image of itself as anti-corporate and rebellious, and presented Shawn Fanning as the youthful face of the company (B. C. Taylor, et al., 2002). They used this representation to help strengthen and enhance the value of the community they were building. Through their website and, as we shall see in the following section, their software, Napster gathered users who bonded over practices that felt as if they had organic origins within the community. The culture of the community was reaffirmed with each download.

Communities of Circulation

An analysis of Napster's interface reveals how much the program anticipates current trends in new media. Napster's software was an instrumental component for gathering and organizing its commodity community, but it did more than just collect a group of potential consumers. It made visible the idea of swapping music and illustrated in a compelling and powerful way one of the fundamental concepts of the Internet: the Internet as a thoroughly networked and interconnected space. Napster brought together disparate and transient users with hard drives full of music, for better or worse, and connected them in ways they had not been before. This ultimately had an impact on how users came to understand the act of file sharing and the nature of the digital music they were trading. Even after the company's demise, the community that came together through the software and the contexts through which those users experienced digital music files are central moments in the commodification of digital music.

Interactions between Napster users revolved around the exchange and circulation of files. Given the importance of distribution and movement in the case of Napster, it is helpful to think of users as participating in what Benjamin Lee and Edward LiPuma call a culture of circulation (2002, p. 192). For Lee and LiPuma, circulation is more than just the simple movement of people, ideas or commodities. They see circulation as a cultural process that is sparked by the "interactions between specific types of circulating forms and the interpretive communities built around them" (Lee & LiPuma, 2002, p. 192). The objects, ideas and commodities that people exchange, as well as the technologies and paths that underpin that movement, create and animate different kinds of communities. Practices of circulation enact something. They are performances by users who are bound together by exchange. The idea of circulation cultures seems an increasingly fitting framework for understanding the current mobility of digital commodities. The Internet and other distribution technologies, as Steve Jones (2002, p. 215-216) insightfully notes, remind us that the movement of music and the technologies that move it are central components to how we experience and understand music. As a culture of circulation, Napster has a lot to tell us about the moment of distribution and the influence it exerts on both production and consumption.

The following reading of Napster's interface, then, is as much interested in the ways in which the program connects users and enables circulation as it is with a hermeneutic interpretation of the program's design. Like some of Freidrich Kittler's (1999) media analyses, it pays more attention to the surface of the object's interface than to what it "means" (Partington, 2006, p. 54-55). Understanding the meaning of an interface is only one way of reading it; there is also a way to see how the design of the technology itself creates the framework for meaning to be produced in the first place (Wellbery qtd. in Kittler, 1990, p. xii). In other words, while the Napster interface might mean something, in the interpretative sense, it is also, at its core, an interaction between humans and machines that allows for a reconfiguration and "new forms of connection between consumers (and purveyors) of music" (S. Jones, 2002, p. 222). Accordingly, this analysis looks at what kinds of relations are brought together through the interface, and through the culture of circulation that emerges from its features.

Although Shawn Fanning wrote the bulk of the code for the program, he had help from other users in an IRC (Internet Relay Chat) channel called w00w00 (Menn, 2003, p. 17). The group was a collection of hackers and coders interested in computing and network security issues, many of whom would go on to populate Napster's offices in California (Menn, 2003, p. 17). The IRC discussions not only helped Fanning create the program, they framed the kinds of features Fanning built into the Napster software. While search engines collect data by crawling the web on regular intervals (that were at the time daily or weekly), IRC channels kept constant tabs of who was online and connected to the group and who had signed off (Menn, 2003, p. 34). Fanning built this insight into Napster's features: "My idea was to have a real-time index that reflects all sites that are up and available to others on the network at that moment." (qtd. in Menn, 2003, p. 34). The result was that Napster — like many of today's instant messenger clients or social networks — provided a constant awareness of the presence of other users and of the contents of the network.[13] Napster's interface further reinforced this network awareness by providing a constant count of how many users were on the service and how many files they were sharing (see bottom of Figure 7).

[13] For specifics on how Napster's P2P indexing and search functions work see (Parameswaran, et al., 2001).

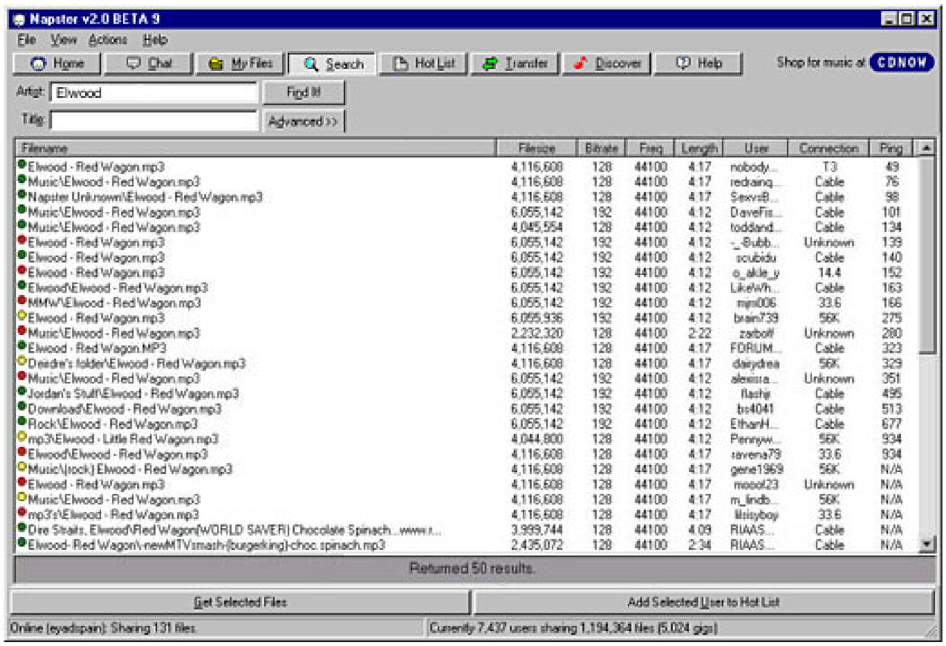


Figure 7 – Napster's Main Search Window
Napster's search window provided access to the program's various features (search, hot list, transfers, etc.). It also showed users how many other users were online and how many files they were sharing. Image retrieved from the Internet archive version of Napster.com.

By June of 1999, Fanning had a first version of the program ready. The following version came out shortly thereafter and it contained most of the key elements that would define its interface over the next year and a half. The program included an "Advanced Search System", a "Library", a "Transfer Window", an "Audio Player", a "Playlist", a "Chat System", and a "Hot List" (Napster, 1999). Napster's near instantaneous indexing of all the files on the system meant that as each user logged on, their shared folder was immediately visible to all other users on the system. Searches were quick and they returned a dizzying array of files. Anyone who has used the software, or a similar program, likely remembers their first search and the mixed feelings of awe (*wow*, I can't believe all this music is there) and trepidation (wow, I *can't believe* all this music is there). Napster promoted these feelings by stuffing the search results window with entries. The text was a small but readable list and the interface seemed maximized to show as many results as possible. By focusing on the vast amount of material for circulation, the interface heightened the affective experience of searching for and finding music. Each file query was an indication both of the amount of movement taking place on the network as well as the sizeable amount of other users who were engaged in a shared practice. Searching simultaneously revealed the music users were seeking and validated participation in the community.

In addition to indicating the availability of songs, searches returned other information about the file (e.g. bit rate, the length of the song, the frequency at which it was recorded, the nickname of the user providing the file and details about their connection speed). While this string of information seemed like nothing more than minor technical details, the choice to include this metadata was one of the ways that Napster brought its circulation culture together. It allowed users to peer, ever so slightly, into the lives and habits of other users as they browsed or traded. Each search for a file or artist returned a multitude of results, each one a partial glimpse into the library of another. To know that "dsknutz" had a T1 connection meant knowing that your download would be served quickly but it also set up a hierarchy of users. In an environment where access to songs was governed not by price but by how quickly one could move them on or off a computer, resources like these confer, as Poblocki (2001, p. 7) and Jean-Samuel Beuscart (2005, p. S8) note, a certain status and reputation upon users with higher technical resources. Circulating files on the system was not simply an altruistic act of providing music. It was also an act of display, one where a user's tastes, preferences, and technical attributes were public and part of the movement of music through the community.

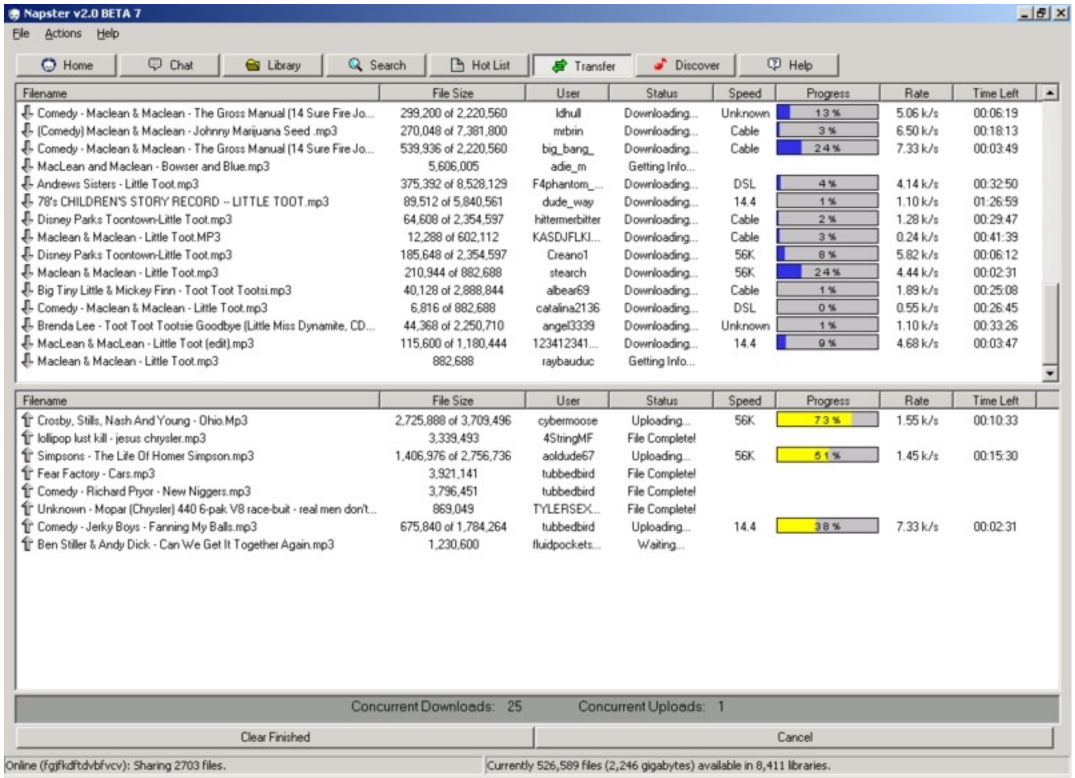


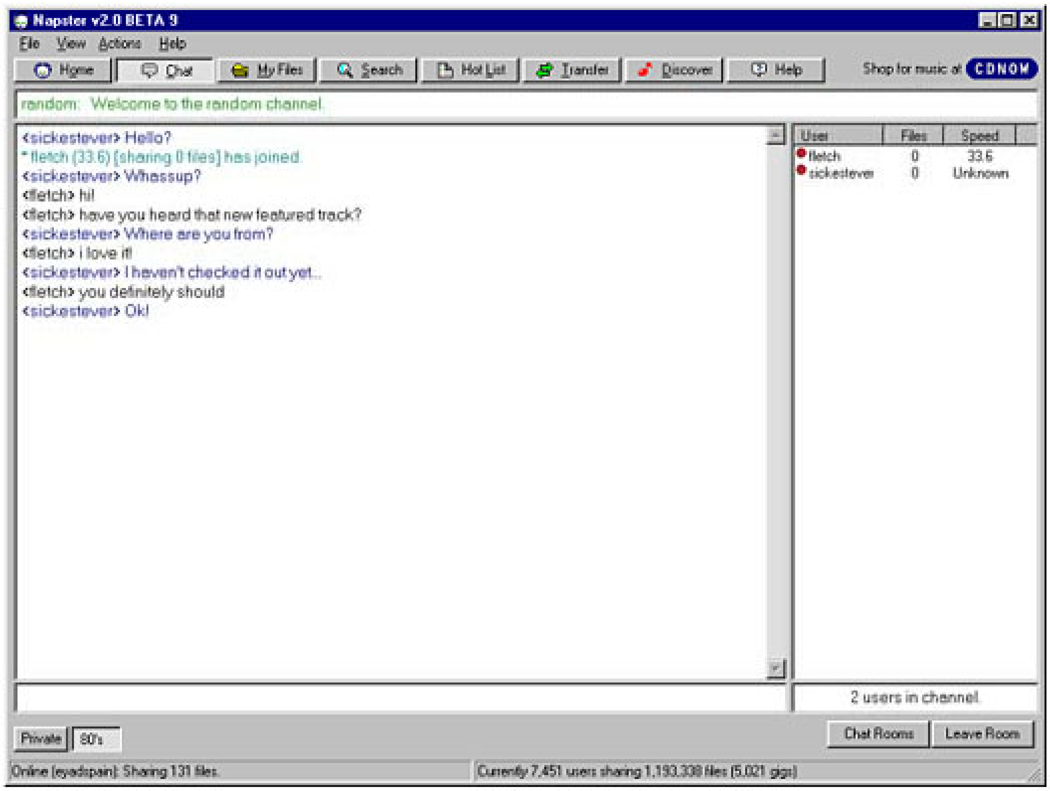
Figure 8 – Napster's Transfer Window
Napster's transfer window made visible the idea of a networked community and put the act of waiting on display. Image retrieved from the Internet archive version of Napster.com.

The transfer window kept users apprised of the status of files coming in and out of their computer (see Figure 8). While contemporary downloading software connects to multiple computers (and users) to download a single file, Napster worked on a one-to-one basis. If a user was downloading a file from aoldude67 and (s)he disconnected, the user would have to wait until (s)he was back online or find another user with the same file. Circulation, here, depended on the willingness of others in the community to stay online, creating a certain technical tangibility to the relationships between users. The transfer window also displayed the usernames of people that were in the process of downloading files, giving an ambient sense of which files were popular and the tastes of other users. As peers connected and disconnected, and music moved to and from different machines, users left traces of their presence in the transfer window. Watching transfers take place made concrete the idea of a network of connected users.

Visible distribution through the transfer window also added an extra moment of anticipation in the consumption process. Susan Willis (1991), building on Marx and Gramsci, argues that the anticipation for the moment of consumption is a key source of our attraction to (and dependence on) the products of every day life. In her eyes, "commodity capitalism fully develops the anticipation of use value while use value itself seems to serve no other purpose but to create the basis for its anticipation" (Willis, 1991, p. 6). Waiting to consume is as important to commodification as consumption itself. Typically in music consumption, the moments of finding a desired object and acquiring it are usually separated by time, though that time is greatly reduced in an age of digital distribution. Napster, for example, had a combined audio library and music player; it essentially combined the acts of searching, collecting and playing music (which, as I describe in Chapter 4, becomes one of the central insights of the iTunes store). Even though Napster promoted near-instantaneous distribution and acquisition of files, the transfer window put the brief period of waiting on display and incorporated it into the downloading experience. Like the clear plastic packaging that envelops everyday products and heightens our anticipation and fetish for supermarket commodities (Willis, 1991, p. 5), watching a file crawl or fly in through Napster was to anticipate the arrival of new music and new sounds. Despite the alternative forms of exchange taking place, Napster was still taking cues from the presentation of other more typical commodities.

Beyond these basic functional aspects of the software, Napster also included specific community-oriented features such as Chat and HotList to help organize its audience (see Figure 9). For Fanning, Napster had always been as much about creating a music community as it was about finding music: "It was rooted out of frustration not only with MP3.com, Lycos, and Scour.net, but also to create a music community" (Varanini, 2000). While this claim may be slightly revisionist,[14] the Chat and HotList features suggested the community aspect was not mere posturing. The Chat feature, which clearly drew on the functional and technical features of IRC, let users maintain loose ties on the network either individually or through group chat rooms (Poblocki, 2001, p. 7). While all users saw nicknames pass by during uploads and downloads, chatting put users in direct communication with each other. Through this feature, Napster's interface facilitated an age-old practice: sharing music and telling other people about it. Napster, as Jones (2002, p. 214, 225) notes, enabled not just the movement of music but also the movement of discourses about music.

[14] Napster's legal status depended on showing substantial non-infringing uses of the software. The "community" angle might have been a way to show the technology served some other purpose.



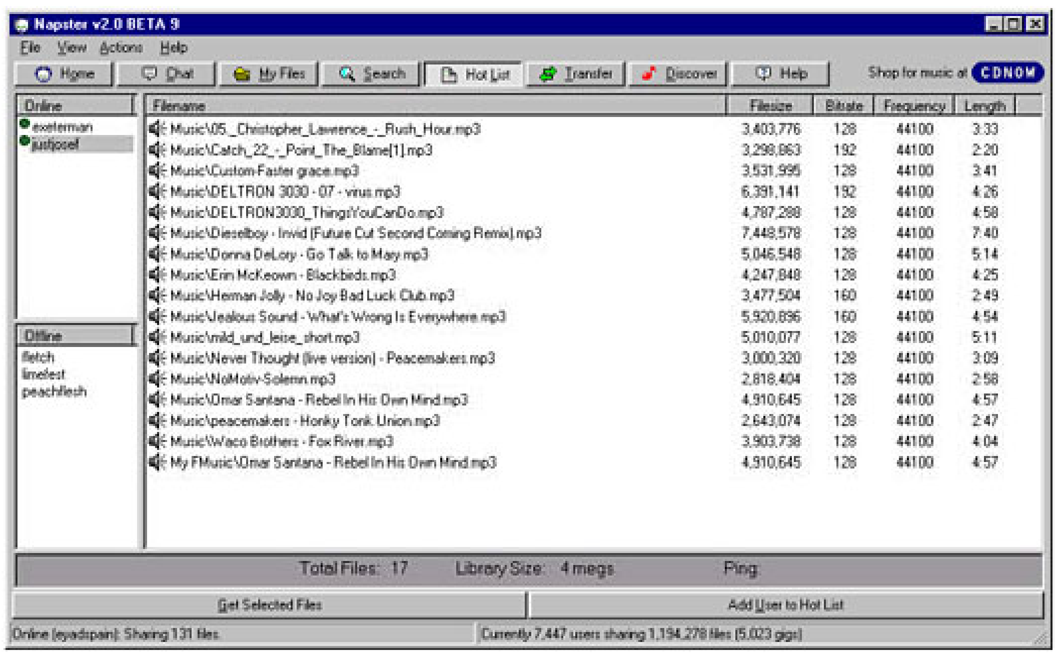


Figure 9 – Napster's Chat and Hot List Features
The Chat and Hot List features enhanced the community aspects of the software and presaged many of the features of today's popular social media sites/programs. Images retrieved from the Internet archive version of Napster.com.

The HotList was another way to engage with other members of the community. It allowed users to compile a list of other peers to "follow". Each time these hot listed peers signed on, the (new) contents of their library became visible to users that were following them. Like the chat function, the HotList not only facilitated more effective searching, it also focused users on the rest of the Napster community. It was a way of following users with particular tastes and a primitive form of music recommendation that helped users navigate the network. The people in any given user's hot list were resources for weeding through the massive amount of music on the network. By integrating the choices of other users into one's own process of searching for music through the Hot List, Napster reminded users that one of the most effective ways to find out about music was through other listeners. Instead of a world without gatekeepers, Napster suggested the best gatekeepers were other users whose tastes we respected. This is the insight that underpins much of the mp3 blog movement and much of the social music software and recommendation engines that have developed (e.g. Last.Fm) in the last decade. Napster's software suggested that tastemakers are all around us; they just need to be connected.

It was in these respects that Napster's primary innovation, as Beuscart (2005, p. S5) notes, was more organizational than technical. Even though "the software was a substitute for the interactional and technical skills that used to be necessary [to download files]" and Napster represented a "dynamiting of existing arrangements [that] made it possible to download music on a much larger scale" (Beuscart, 2005, p. S5), Napster's main achievement was how it organized its user base through its software and website. While the website was an explicit attempt to build/facilitate a community, to provide it with direction and purpose, the interface worked at a more implicit level. It drew users together in a series of technical and social relationships through its features; relationships that were premised on the circulation of files and making that movement and connection visible to users. Like other mass mediated communities (Poblocki, 2001, p. 3), one of the only ways users could understand each other in this relationship was *through* the interface and the partial glimpses and traces it offered of others on the network. Napster showed that digital music was readily available, highly searchable, and intimately social. Users could see file quality, speed of delivery, and the array of other users who were also interested in the same kind of music. It showed users, in real time, what other users had on their computers. It helped make tangible the intangible idea of a mass of connected computers, by displaying the activities of other user and by allowing them to interact. It made the moment of transfer a moment of anticipation and it let users peer into other user's digital closets.

TRACES OF CIRCULATION

Even though Napster may not have profited directly from its audience, the commodity community it brought together presented novel opportunities for advertising, market research and surveillance (McCourt & Burkart, 2003, p. 335, 343). Mark Andrejevic (2007) notes that digital media generate a significant amount of data about the patterns and behaviours of users. New and "interactive" technologies, like TiVo or other personal video recorders, may appear to provide more choice and control over media consumption, but these benefits depend highly on users surrendering private information and personal preferences to heavily monitored databases (Andrejevic, 2007, p. 74-92). This is not only specific to newer media; previous media technologies have also created traceable and commodifiable information. However, relatively crude measurement tools from early 20th century market research, like phone surveys, have morphed into complex devices like the TiVo, "in which the very act of viewing simultaneously becomes a form of feedback" (Andrejevic, 2007, p. 88). As Andrejevic (2007) argues:

> The 'freedom' allowed by TiVo — the ability to watch shows whenever one likes — came with a dramatically heightened level of viewer monitoring: the ability not just to determine which households are watching what shows, but the minutiae of how they are watching and when, including how often they rewind, fast forward, pause and so on. TiVo promised a quantum leap in the ability of producers to monitor viewers. (p. 11)

For Andrejevic, this constant surveillance creates what he calls a "digital enclosure" (p. 2). In digital enclosures, media consumption through new technologies carries with it surveillance and data mining opportunities.

As anti-corporate as it appeared, Napster was a primitive version of a digital enclosure. Napster's networked nature and the amount of information that circulated through that network provided a highly useable database. It also provided an example for the major record labels of how to use technology, litigation and legislation to control the flow of commodities and exploit the power of information (McCourt & Burkart, 2003, p. 343). Despite users' attempts to remain anonymous through cryptic usernames or dynamic IP addresses, some companies were able to organize, mine, sell or otherwise use this cybernetic information (Andrejevic, 2007, p. 3). Although Napster undoubtedly intended to use this data itself (Menn, 2003, p. 122), it was ultimately too busy responding to legal charges to fully realize the benefits of its commodity community. Napster's user base, however, was not only valuable to Napster. As the number of Napster users grew, so too did the number of other companies looking to leech off of their audience (J. Brown, 2001).

Big Champagne is probably the best-known peer-to-peer audience measurement company. It provides numerous research services to its clients, including charts detailing which files are the most traded and which songs are trading well in particular regions. It is one of the most-cited sources on file-sharing traffic. Big Champagne measures online music retail outlets (iTunes, Rhapsody, etc.), social networks (MySpace, Last.Fm, etc.), portals (YouTube, AOL, etc.) and file-sharing networks. It provides "published consumer data of various online communities [...and enables] content creators to improve distribution, customer profiling, and permission-based marketing" ("Big Champagne", 2010). Big Champagne's current status as the Billboard or Nielsen Ratings (Howe, 2003) of file-sharing networks, however, owes a large debt to Napster's audience and software. Before Big Champagne got into the business of tracking file-sharing traffic, the company's founder was using the Napster network as means of subversively marketing music (Dansby, 2008). In 1999, Eric Garland, an amateur musician and management consultant, hooked up with Glen Philips, the former lead singer of Toad the Wet Sprocket. Philips was starting a solo career and Garland was helping him design a mailing list to keep track of his fans. Philips noticed that users were trading files of his old band on the nascent Napster service and he wondered whether there was a way to convert some of his old popularity to his new project (Dansby, 2008). Along with another friend, Garland and Philips built a program that "sent anyone sharing a Toad the Wet Sprocket song an invitation to join Philips' mailing list" (Howe, 2003). Around 20% of users contacted ended up joining the mailing list, a significantly better response rate than the traditional 2 to 3% that many direct marketing attempts achieve (Howe, 2003).

Encouraged by this trial, Garland created Big Champagne and approached potential clients about conducting a more official marketing effort. The result was a promotion, in late 2000, for singer songwriter Aimee Mann. They sent any Napster user sharing Mann's songs direct messages through the chat feature: "I see you have some Aimee Mann songs on your hard drive. Aimee Mann has a new promotional song, go check it out at aimeemann.com" (J. Brown, 2001). Mann initially had significant reservations about Napster; it was her manager that suggested the promotion. The campaign resulted in 1,700 new members joining her mailing list and it helped Mann and her manager see the service in a new light: "Really, I think that if we could have some kind of relationship with the people who are downloading the songs, we'd feel a lot better about [Napster]" (Mann's manager qtd. in J. Brown, 2001). Other artists and record companies were also hesitant to work with the company. The record labels were especially afraid of promoting any legitimate use of peer-to-peer technology and contradicting their no-tolerance policy towards file sharing networks (Howe, 2003). If companies dealt with Big Champagne in the early years of file sharing, it was usually in secret. It was a research strategy that "dare not speak its name" (Howe, 2003).

As file-sharing networks proliferated in the wake of Napster and as the amount of information those networks generated increased, many of the major labels started using Big Champagne's information directly and indirectly to supplement their campaigns (see for e.g. Capitol Records' promotion for Radiohead in Mathews, 2001). They graduated from instant message marketing or "instant spamming"

(Olsen, 2001) to more sophisticated data collection techniques. Big Champagne is now cited regularly in discussions of and reports on digital music and online distribution. In 2003, it signed a deal with a [radio conglomerate] Clear Channel subsidiary, allowing each company to make use of the other's information database for research purposes. In 2005, Big Champagne announced a partnership with Billboard Radio Monitor, and claims to offer "immediate access to the music preferences of the largest listening audience ever measured" (Billboard, 2005). Like the difference Andrejevic (Andrejevic, 2007, p. 87-88) notes between telephone surveys and people meters, Big Champagne purported to measure what people were *doing* not what they were *saying* or *thinking*. They sold this as a more scientifically accurate and informative method of measuring online communities than previous methods of tracking music sales. As Garland explained: "We seized onto P2P because it allows a singular opportunity to observe really intimate consumer behavior. You're not asking them what's your taste in music, games, books, what have you — you're looking in the pantry, straight into the fridge" (J. Brown, 2001). For Big Champagne and other market research firms, these connected and visible networks are like "gold mines" of data (Olsen, 2001). They are a way to turn a community of file swappers into a commodity that can generate data and, in Big Champagne's case, revenue from that data.

Marketing companies were not the only ones able to source information from Napster's audience. User participation in the network also provided data that ultimately enabled the RIAA during its legal challenges against file sharers. Just as marketers used individual and aggregated file-sharing patterns to deduce tastes and preferences, the RIAA used similar data to bolster their claims of copyright infringement. In a declaration made in a court case in 2003 — the RIAA was challenging Internet Service Provider Verizon for access to some of its customer data — Jonathan Whitehead, VP of Online Copyright Protection at the RIAA, shared how the industry group was able to track down file-sharers through the metadata that users made available, knowingly or unknowingly, through the files they had traded on the Napster network ("How Downloaders Are Tracked", 2003; Whitehead, 2003). One particular example involved a Jane Doe, who went by the username “nycfashiongirl@kazaa.com”. The RIAA had accused nycfashiongirl of sharing a large amount of copyrighted files through Kazaa (a post-Napster file sharing program). The defendant’s lawyers claimed that nycfashiongirl had used Kazaa primarily as a media player and that she had disabled any file sharing access to copyrighted sound recordings (i.e. she may have downloaded files, but she did not upload: the digital age’s equivalent of the “I smoked but did not inhale” argument). Through the use of Kazaa’s software, the RIAA’s investigation team debunked this claim by accessing and analyzing nycfashiongirl’s “shared” folder. Contrary to the claims that she had turned file-sharing off, the RIAA team was able to access over 1100 files ("How Downloaders Are Tracked", 2003; Whitehead, 2003, p. 3). Looking at the metadata of those files, the RIAA was further able to determine that the majority of songs came from online sources or other Kazaa users and not from CDs that nycfashiongirl owned and copied into her shared folder, as her lawyers claimed. Most of the files in her folder included ID3 tags with comments indicating their original source, for example: “ripped by pbv”, “Ripped by ATOMIC PLAYBOY 1999!”, “Uploaded by Smog” etc. (Whitehead, 2003, p. 6). Many files also included the url of the website/archive from which they were downloaded and the name of the encoding software used (Whitehead, 2003, p. 6-7). Some even contained statements encouraging further infringement, like "SHARE WITH OTHERS" (Whitehead, 2003, p. 9).

Perhaps most damaging, the RIAA argued that the hash tags from many of the files in nycfashiongirl's share folder indicated that the songs came from the original Napster network. Hash tags, the RIAA argued, are equivalent to the "fingerprints" of a file ("How Downloaders Are Tracked", 2003; Whitehead, 2003, p. 12). They are a "computed value based on the properties of the individual bits in a file" (Whitehead, 2003, p. 12). File sharing services make use of hash tags to locate other versions of the same file, in case one user disconnects from the system and a new source file is needed to complete the download. The hash tags in nycfashiongirl's share folder matched some of the ones the RIAA found in the original Napster database years previously. The RIAA argued that nycfashiongirl had been making these files available since as early as 2000 (Whitehead, 2003, p. 13). Since the courts had already deemed Napster guilty, the presence of Napster-era files in nycfashiongirl's shared folder only made the case against her harder to refute. Whether or not one agrees with the RIAA's argument, or accepts that it is possible to link a user name to a particular person's behaviour through metadata, the declaration shows the extent to which new media audiences make available information that serves a variety of purposes, be it file-sharing, marketing, advertising or even criminal investigation. In this case, the RIAA was able to make use of Napster's data even though the service had been shut down for months. The traces its audience left behind were still in circulation. The RIAA used these traces as "biometric" proof, an "empirical remainder — a trace of physical evidence that can't be staged" (Andrejevic, 2007, p. 38).

Napster's community provided a wealth of data for services and purposes other than those that were immediately visible to Napster itself. Despite the claims that Napster, like TiVo, would be an "empowering" technology that was set to "disrupt" its industry, the kinds of data Napster made available fit well into traditional commercial enterprises and became useful tools for the RIAA's legal pursuits. Even as Napster promised "free" music and a "choice" of whether or not to participate in the regular economics of the music industry, it also provided new kinds of information about music consumers and their patterns that fed back into the commodification process (McCourt & Burkart, 2003, p. 346). A publicly accessible index of downloadable songs available to networked users wasn't just an ideal way of swapping files, it was also a well-sorted database for the purposes of advertising, market research, and other forms of monitoring (J. Brown, 2001). Some companies, like Big Champagne were able to build viable businesses based on Napster's commodity community. Other entities, like the RIAA, used the data as means of tracking and punishing what it deemed as illicit behaviour. Napster's audience may have signed up to for the free music, but in the process they were willfully submitting to a kind of monitoring that gave other actors on the network greater insight into their behaviours and preferences than ever before. The community commodity invites a multitude of relationships, some social and some commercial in nature.

NAPSTER WAS HERE

The summer of 2009 marked the ten-year anniversary of when Shawn Fanning first released Napster. The occasion was accompanied by a flurry of retrospective profiles in local newspapers and magazines (see for e.g. Bruno, 2009; Evangelista, 2009; Hartley, 2009; Napster - 10 Years of Turmoil 2009; Van Buskirk, 2009b). When asked about Napster's enduring legacy, former RIAA President Hilary Rosen had this to say:

> There's no question Napster galvanized the process in several important ways. […] it brought consumers into the discussion for the first time. All of a sudden, record companies started hearing from music fans in a way they never had before. The "customer" for record companies for many years were radio stations and record stores. All of a sudden record companies were on the hook from music fans. (qtd. in Bruno, 2009)

Obliquely, Rosen acknowledges that one of the software's most lasting impacts was organizational in nature. What was different about Napster were the novel and interesting ways in which it organized its audience through its software and website. Napster brought together a group of users via its interface and made visible the kinds of circulation and connections that were constitutive of the digital music commodity.

This chapter has argued that this audience was not simply an organic oppositional community though. It was a commodity community designed to provide value for its developers. Despite the troubled nature of the practices Napster promoted, the company hoped to build a business model off of its ability to gather and connect users. Napster was not successful in profiting from this commodity community in the long term, though they certainly benefited from the work of their users during times of legal troubles and via early venture capital funding. Other actors like Big Champagne or the RIAA were also able to mine the community for information. Napster was a form of digital enclosure where music-sharers who had gathered under one pretense suddenly found themselves labouring in another.

Not only did Napster generate a commodity community that suggested the viability of an online digital music market, the way it presented digital music to its users also helped shape the emerging digital music commodity. Napster emphasized the fluidity and mobility of digital music and focused users on the act of circulation. Interfaces are not just mediators between users and the programs they use, they are ways of knowing about the objects the program acts upon. Napster provided its users a shared way of knowing and thinking about music as a digital file. The interface showed users when uploads were leaving and when downloads were arriving. Users could wait with anticipation for transfers to finish. Napster offered chats with other users and means of finding tastemakers amongst a huge network of users. Users could peer ambiently and actively into the tastes of others and, in doing so, realize the fundamentally social aspects of music consumption. Napster provided a means of searching for files with fine grained technical details and made these characteristics part of the culture of music's circulation. It was a visual metaphor, a concrete demonstration of how networks worked. These are the features and qualities that helped the original Napster gather its commodity community, and helped users feel part a natural and organic community that was engaging in alternative (even subversive) forms of circulation and exchange.

Even though the current version Napster has a sizeable user base — just under one million — that pays regularly for music, it is only a brand name and logo-inflected shadow of its former self. Counter-logically, Napster's influence on the commodification of digital music is less now than it was when Napster was giving away music for free. Far from a rogue piece of software that destroyed the music business and turned everyday consumers into plundering pirates, the early version of Napster was a business that helped create a market for digital music commodities and a template for how new media properties manage the affective and economic relationships with their users. Napster's innovations are visible throughout digital music. Sites ranging from iTunes or Last.Fm to the Pirate Bay and Bit Torrent have all built into their services many of Napster's key features. In one of the tenth year anniversary retrospectives about the company, ex-Napster CEO Hank Barry argued "Without Napster, there is no iPod, period" (qtd. in Hartley, 2009b). Although Barry is probably referring specifically to the fact that Napster's massive database of "free" music was one of the prime ways for consumers to fill the massive storage capacity of Apple's portable music devices, his claim should be further extrapolated. Napster did not just generate a community that helped boost iPod sales; it also organized users that were ready to take part in all manner of digital music and online media services. Napster's impact on the economics of the music industries is secondary to the audience that Napster organized, the means through which it gathered them, and the community's subsequent interaction with music as a digital file. Even after Napster was shutdown, its users continued to gather and circulate music, and to engage with the digital music commodity, either through other file sharing networks or through some of the more "legitimate" retail outlets that followed in Napster's wake. I turn now to examine the most successful of these efforts: the iTunes Music Store while bearing in mind that, without Napster and its users, it would not likely have been conceivable or realizable.

Chapter 4 – Click to Buy: Music in Digital Stores

Selling Music Online

In its round-up of the "Coolest Inventions of 2003", *Time Magazine* honoured innovations such as the Nasal-Mist Flu Shot, the Toyota Prius, and the Robo-lobster — a robot the U.S. Navy was using to scour the ocean floor for mines and other explosives (C. Taylor, 2003). Alongside such worthy technologies *Time* also recognized the iTunes Music Store, released earlier that year. On April 28, Apple Computers CEO Steve Jobs had taken the stage at a special event to announce to journalists, techies, and die-hard Mac heads that Apple had a solution for rehabilitating the music commodity. An online music shop with a "user-friendly" interface that integrated with Apple's iTunes media player and the iPod, the iTunes Music Store was a digital retail outlet where consumers could legally purchase music from a wide selection of record-labels. For 99¢ a song or $9.99 an album, users received a speedy download of a working, virus-free file that came with digital album art and accurate metadata. *Time* apparently agreed with Jobs' hunch that Apple's "99¢ solution" would be *the* model for selling and distributing digital music files online in a post-Napster landscape. *Time* was likely also impressed by the store's rapid growth. The iTunes store had sold 1 million tracks in its first week; 5 million by week 8 (Apple, 2003a, 2003b). On the first anniversary of its launch, the iTunes store had sold over 70 million songs and held more than 70% share of the legal download market (Apple, 2004).

Whether these numbers make the iTunes store as significant an innovation as a hybrid car or a robotic crustacean is debatable, but I rehearse them to suggest how central Apple and the iTunes Music Store have become to the music industries. Currently, the store not only sells more music than any other digital retailer; it is the leading music outlet in North America, ahead of Target, Wal-Mart and Amazon (Bangeman, 2008). Apple has also branched out beyond music, selling movies, TV shows, podcasts, "apps" and a host of other digital commodities (e-books forthcoming). Just over a decade ago, selling music online was barely conceivable. Now, in large part because of iTunes, it is a thriving commercial market and the fastest growing sector of the recorded music industry (IFPI, 2010; Martens, 2010; Walsh, 2010). As such, this chapter looks at the case of the iTunes Music store and the evolution of online retail music stores more generally. Rather than a chaotic and disorderly process of disruption, the rise of online retail in the late 90s was a series of struggles for control over the business of selling music and over the music commodity itself. Apple's iTunes Music Store resolved much of the conflict accompanying the digital music commodity by hiding or masking the challenges of digital music and presenting them in a familiar and simplified interface. Beyond its "user-friendly" appearance though, the tactics Apple uses to market individual songs and albums set the terms for the experience of digital music for artists, listeners, and other online retailers. It is a networked store, connected by various technologies and interfaces that dissolve the barriers between the personal collection and the retail outlet. The iTunes store fuses the moments of purchase and playback and reinforces the idea that our music libraries are not just repositories for our favourite songs and albums, they are commodified and networked databases designed to encourage even further consumption.

More importantly, the iTunes store has been pivotal in promoting the very idea that digital music *can be* a commodity, a digital item with a price tag. Apple has managed to commodify digital music and, more precisely, the experience of digital music such that people are willing to pay for files they can find readily for less (or free) elsewhere. Apple's "solution" was as much about adding value to the act of buying digital music as it was about sprucing up the music commodity. The iTunes store navigated and incorporated different conceptions of the "digital economy" in order to promote its vision of digital retail. While other companies sought to control digital music through overt legal strategies or digital rights management technologies, Apple used its proprietary technology as a mere building block towards establishing much more subtle, design-inflected tactics for promoting continued use of their software and devices. Through its interface, navigation, price and methods of organizing music, the iTunes store showcased the music commodity in its digital environment and sought to rebuild some of the value that drifted during the migration from music on CDs. In doing so, it did far more than re-sell music in the online environment; it promoted a kind of digital lifestyle management that embedded both music hardware and software ever more ubiquitously into everyday life.

CONTROLLING DIGITAL RETAIL

One of the underlying assumptions of this dissertation is that the transition to a new format of any given commodity temporarily calls into question the conventions and practices that accompany the presentation and sale of that commodity. Like other commodities that raced online in the mid-nineties, music went through a transitory period (arguably, still underway) where the business models, technologies, and social meanings that structured its movement were catching up to the new environment in which music found itself. As digital music files began their diffusion, makers and manufactures of music came face to face with how to present, market and distribute the new format. Simultaneously, users were reassessing what the recorded music experience meant now that the commodity was digital. Each new business model or idea had to address basic questions and assumptions about music that were formerly taken for granted, as did each new device or space through which consumers could access music. Attributes such as price, appearance, availability, mode of distribution and means of playback all needed to be re-visited as new technologies and consumer practices crystallized. Even though the nature of a zero moment such as digitization means that there are limits and forces influencing the amount of change that is possible, through changing cultural and technological conditions, parts of the music commodity had become candidates for re-definition.

Take the example of SightSound Technologies, a "media eCommerce consulting" company with interests in audio and video distribution. In September 1995, SightSound claimed to have sold the first ever digital music download online: an album by Pittsburgh-based folk-rockers The Gathering Field (SightSound, 1995-2002). For $6.00, users could buy The Gathering Field's entire 634.2MB self-titled debut album, which took anywhere from 20 minutes to dozens of hours to download (SightSound, 1995-2002). SightSound were clearly excited about the historical precedent they were setting: "That's right, the entire disc [is] sold, then electronically delivered via the 'Net to the buyer. You can make history too. Order your own copy…" (SightSound, 1995-2002). For SightSound, users who purchased

The Gathering Field, weren't just buying an album; they were taking part in a new way of buying music.

SightSound hoped this new way of buying music would be exclusive to their company. Thanks to several patents they held, SightSound felt it had the sole right to sell and distribute digital music online. Company co-founder Arthur R. Hair had received a patent entitled "Method for Transmitting a Desired Digital Video or Audio Signal" in 1993 and a similar one in 1997 (Hair, 1993, 1997; SightSound, 1995-2002). Both patents described technology that facilitated the sale and download of audio and video files via phone lines and Internet connections. In 1997, SightSound started filing lawsuits against other online music retailers — such as CD Now and N2K — that were starting to sell digital files of their own. They sent letters to MP3.com (1998) and GoodNoise (1999), demanding a percentage from every single digital sale those companies made (Lemos, 1999). Since SightSound had patents on the technology for selling digital downloads, they argued that the very *idea* of digital downloads was, in essence, patentable. In other words, no other individual or company should have been able to sell digital music online without recognizing SightSound's patent. As one of the co-founder's said bluntly in an early interview: "We own digital download. We have won" (Newman, 1999).

SightSound's story is a telling example of how certain actors use moments of technological change to secure economic and cultural advantages through law, regulation, and/or technological design. Admittedly, the anecdote represents an extreme case. However, their attempt to own online audio and video distribution as a business method was just one among many tactics companies were using to establish control over this emerging market. By arguing that digital music delivery was a unique business solution, they were staking ownership in not just the music, but in the very act of acquiring it. SightSound was hoping to profit from music and from the means of selling it. That SightSound was actually remunerated $3.3 million (USD) over the course of its lawsuits only illustrates how vulnerable the codes and conventions surrounding the movement and use of certain commodities are when the format of that commodity changes (Chang, 2004; Petzinger, 1999; Valence, 2000).[15]

The introduction of new technologies is rarely a stable and cohesive process. As researchers in the social construction of technology suggest, there is a certain "interpretative flexibility" that accompanies the advent of new technologies (Bijker & Law, 1992, p. 76; Oudshoorn & Pinch, 2003, p. 3). For different social groups, artifacts can present themselves as essentially different objects (Bijker & Law, 1992, p. 76). As Wiebe Bijker (1992) demonstrates with the case of the fluorescent lamp, a variety of relevant actors each exert influence on the advent and development of new technologies. When lamps were introduced, fixture manufacturers, utility companies, lamp manufacturers, customers and other parties all had ideas and sway with respect to the forms and features of the technology (Bijker & Law, 1992, p. 76). The result is that the uses to which new technologies can be put are generally in flux, though conflicting meanings and ideas generally stabilize over time (Bijker & Law, 1992, p. 76-79; Pinch & Trocco, 2002, p. 9-11). However, interpretative flexibility is not a completely open-ended process. It is tempting to portray the introduction of new technologies as completely disruptive: as a chaotic and disorderly moment where

[15] SightSound eventually settled its 5-year lawsuit against CDNow! and N2K out of court. According to the agreement, Bertlesmann conceded the patents were valid, though they admitted no infringement on their part (Chang, 2004).

everything and anything could change and the power or market dominance of existing players is under threat (Christensen, 1997, 9-15). Despite the potential for change, new technologies are equally capable of further enforcing entrenched entities and sustaining traditional ways of doing business (Christensen, 1997, 9-15). The music industries, for example, have repeatedly faced flux, crisis, and technological change, yet market dominance has generally remained concentrated in the hands of a select few key companies (Garofalo, 1999; McCourt & Burkart, 2003).

The idea that new technologies engender chaos and disorder, as some business and industrial historians suggest, is actually a myth that conceals a process of rational change (Gomery, 2005, p. XVIII, 1-6). Industries like music or film depend on, and invest heavily in, regular technological advances. They expect and plan for change. They make it part of their long-term strategies. Or, as Charles Acland (2009) notes about the recent rise of 3D technology in film and television: "the language of 'game changing' is another way to talk about business as usual". When looked at from a wider industrial point of view, what seems like disruption reveals itself to be multiple small-scale struggles over the creation of markets, and the codes and conventions that govern the flow of specific commodities. Furthermore, while the transition to digital files put some aspects of music's commodity form into question, it is not as if new technologies obliterated the idea of the music commodity entirely. As Chapter 1 showed, innovations are firmly embedded in past ideas and practices and there is much more to the music commodity than simply format and packaging. Similarly, Chapters 2 and 3 suggest that even users actively engaged in working against the commodification of the digital music are inadvertent participants in the process. By making music sortable and organizable, users start to treat digital files more and more like traditional commodities. Interpretative flexibility is not a blank slate; it depends on the nature and pre-existing conditions of control and power that govern the zero moment.

Just as there were several competing "visions" of the fluorescent lamp (Bijker & Law, 1992, p. 81), multiple models for the sale of the digital music commodity emerged in the mid to late nineties. Each one offered a particular conception of how music should be presented, distributed and sold. Before SightSound, and before the advent of browsers, countless smaller artists and labels were experimenting with the Internet as a virtual storefront for the sale of physical CDs and other music commodities (Marino, 1997). Sites like the IUMA were thriving communities for marketing and, secondarily, selling music and merchandise (Dube, 1997), but they were hardly fully functional retail outlets (Dube, 1997, p. 4). More polished online stores followed with the likes of CDNow!, N2K's Music Boulevard, and eMusic (launched in 1994, 1995 and 1995 respectively). These companies set up websites where consumers could order CDs or cassettes by phone, fax or secure email (Capuzzi, 1996; "Now Open!", 1995; Wickre, 1995). Not to be left behind, traditional retailers like Tower Records and record labels like Windham Hill and ECM jumped online with similar offerings in 1995 (Gillen, 1995). Compared to "brick-and-mortar" retail stores, these online shops prided themselves on convenience, the size of their catalogues, and on all the contextual information (e.g. biographies, reviews, editorial commentary, and other kinds of non-embedded metadata etc.) they provided during the act of browsing (Wickre, 1995). Like Prince's *Crystal Ball* though, these retailers only brought music partially online. They used the Internet as a hub from which to sell traditional formats of the music commodity. While they were all technically “online”, these retailers were not actually selling digital music commodities. They were selling the music commodity, digitally.

Around 1995, digital entrepreneurs started shifting away from these halfway models to fully digital ones. In the process, a further re-conception of the capabilities of the music commodity occurred. Along with SightSound’s attempt to patent the actual business of selling digital music, companies like Cerberus, Liquid Audio, IBM and the major labels used the transition to digital to impose greater control over the music commodity. Although the mp3 file format was rapidly gaining popularity, most of the early digital retail efforts involved other, more secure formats. For example, a British company named Cerberus launched a digital storefront in 1995 that offered over 30,000 tracks at prices that artists set themselves ("Multimedia Business Analyst," 1995; Pride, 1994). One of the conditions of the launch, imposed by the record labels, was that the songs had to be “protected”. In order to play the songs, users needed special Cerberus software with “Cercure” technology (Rosen, 1994). Liquid Audio, N2K and Capitol Records teamed up in 1997 for a similar experiment. They sold a digital download of a Duran Duran single called “Electric Barbarella”. As with Cerberus’ downloads, the song was encrypted with proprietary technology that ensured only users who purchased it through the Liquid Audio player could play it (Alderman, 2001, p. 46; Haring, 2000, p. 68-70; Takahashi, 1997).

In 1998, IBM and the Big Five record labels (at the time, Sony, Warner, BMG, EMI and Universal) had an even bigger plan to create an all-encompassing secure music service that would display, sell, and distribute music online while respecting copyright and facilitating royalty payments (Rawsthorn, 1998; T. Smith, 1999). A trial of the project — known as Project Madison or AlbumDirect —took place with 1,000 users in San Diego from June to December of 1999. IBM and the labels put a positive spin on the results (Nguyen, 2000). Users and journalists were not as kind (King, 2000a). Critics argued that the number of total downloads from the trial (i.e. 4000) was miniscule, and that this number was more than overshadowed by the amount of customer service that had to be provided in order to make the system function effectively. Also, the music was not much cheaper than what was available in stores; the digital rights management system IBM employed limited what users could do with the files; and users could only download full albums, not individual songs. One user even reported needing over 2.5 hours to buy download and burn his first CD (Drummond, 1999).

These companies were some of the earliest musical adopters of digital rights management technologies (DRM), perhaps the most overt form of control that emerged during the transition to digital music. Tarleton Gillespie (2007) defines DRM as "an umbrella term for a family of technical applications and for the legal and commercial arrangements they require" (p. 51). By encrypting the information in files and by encoding devices with instructions on how to use and not use the secured content, DRM affects the usability of digital goods. It is a legal and commercial tool. It enforces intellectual property rights for digital goods and acts as a strategy for "morselizing" digital data such that it can be packaged in various forms of digital commodities (Gillespie, 2007, p. 55-56). Software and game designers seeking greater control of their digital content have typically used DRM. But as digital music took on some of the properties as software, music and technology companies also started using software strategies for controlling the movement and use of music. Ostensibly designed to further commercial and legal goals, DRM helps establish "trusted systems" that ultimately reduce the complex and politically charged issues of copyright, fair use, and intellectual property to mere technical problems (Gillespie, 2007, p. 54). DRM takes arguments about how any given cultural good can and should be used out of the realm of debate; through code, trusted systems impose conditions of use on the user before they even have a chance to choose otherwise (Gillespie, 2007, p. 55). Whether it is Galloway's (2004) insistence that "code = praxis" or Lawrence Lessig's (1999) caveat that code is law, opponents of DRM routinely point out how the infrastructure of the Internet and the design of the hardware and software that access it often set the rules for how we interact with cultural content (Gillespie, 2007; Vaidhyanathan, 2003; Zittrain, 2008).

The rise of DRM is an inextricable aspect of the evolution of music as a digital commodity. In addition to disparate efforts to develop DRM technologies from Cerberus, Liquid Audio and the like, there were also more concerted, industry-wide initiatives, like the 1998 Secure Digital Music Initiative (SDMI). The SDMI was a working group of representatives from hundreds of companies, including music labels, other kinds of content producers, technology companies, and other parties interested in creating a voluntary industry-wide secure format for digital music (Alderman, 2001; Haring, 2000; Lamy, et al., 1998). Instead of Liquid Audio having its DRM and a2b having another, for example, the SDMI was supposed to be an open-forum of like-minded players working towards a shared security protocol:

> This initiative is about the technology community developing an open security system that promotes compatible products in a competitive marketplace. It's not about the recording industry imposing a standard on technology companies. We'll simply provide guidance on the needs of our industry and its customers. (RIAA head Hilary Rosen qtd. in Lamy, et al., 1998)

Despite the RIAA's stated flexibility, it was quickly apparent that the SDMI had too many groups with too many divergent interests (Alderman, 2001, p. 91; Haring, 2000, p. 127-130; Knopper, 2009, p. 150-156). The SDMI's dream for a shared DRM technology was roundly criticized as an overt grasp for power: "The announcement was not at all about security or about piracy--it's about control. By implementing security, they maintain control" (Steve Grady, spokesman for GoodNoise qtd. in Krigel, 1998). The SDMI — which one writer lovingly referred to as Some Dubious Motive or Initiative (Haring, 2000, p. 131) — splintered back into its diverse groups, officially disbanding in 2002 with little progress made save for some social networking opportunities between some of the group's key participants (Knopper, 2009, p. 156).

The drive to control the usability of the digital music commodity, through technological or legal means, was evidence of a paradoxical belief that no profitable digital market could be established without first limiting the *digital* aspects of the music commodity. It was a logic that assumed digital files, as infinitely reproducible bits of data, needed to behave more like physical goods before they could assume their role as digital commodities. Digital music's fluidity and portability were problems not opportunities. Instead of promoting digital music's benefits in their push to establish a market, many actors in the music industries were trying to impose a false scarcity on it (Gillespie, 2007, p. 56). From "Electric Barbarella" to the SDMI, the early history of digital music retail is filled with overt attempts to sell music in ways that would allow the seller to control the shape of the digital music commodity and the markets that would grow up around it. Companies like IBM, Cerberus, Liquid Audio and others were imposing technical and economic conditions over the delivery and playback of music. There were companies, like GoodNoise (now eMusic), MP3.com and RealNetworks that were developing different and somewhat less restrictive models but they generally did so without the blessing, and therefore the content, of the major labels. There were also companies like SightSound fighting legally for business method patents that would make the very act of selling digital music proprietary. In most cases, the integration of security and commercial options directly into software and files left users little flexibility for using the music in a way that was not prescribed by the various proprietary technologies at play. The result was a lack of technical compatibility, a lack of a decent comprehensive catalogue of music, and complicated or overpriced subscription plans. Add to this a good deal of tension between record labels and traditional retailers, both of whom were worried about their future roles as middlemen, and there was a clear gap in the digital music market. None of the online retailers that sprouted during this period offered a business model or product enticing enough to draw more than a few hundred thousand users.

This is partly why Napster and other file-sharing software that emerged at the time seemed so appealing. They offered music for free, in two senses of the word. Users could get music without (directly) paying for it, though technically they were still paying for computers, software, broadband connections and other costs. They were also free to do what they wanted with the music they downloaded. Most of the files on Napster's network were DRM-free mp3 files. Users could burn them as many times as they wanted, use them with their choice of software, and transfer them to different computers on their (or others') network. Napster delivered on the portable and malleable benefits of digital music that other services tried to stifle. No more multiple technologies to figure out, no more proprietary formats, no more multiple sites to which to subscribe. One goal — finding music — one destination. Napster, as even Apple's Steve Jobs (2003) himself acknowledged, "demonstrated that the Internet was made for music delivery". Napster's combination of a massive database of music coupled with multiple ways to recombine and play that music made these early retail sites seem destined for obsolescence and, along with them, the idea of paying for music.

FairPlay

When Apple launched the iTunes store, it introduced its own proprietary DRM a technology called FairPlay. Given the limited success of previous DRM attempts, the move was risky. It was also necessary. Apple had previously taken flak from major labels and other content industry players for its much publicized "Rip, Mix, Burn" campaign supporting its CD-burning desktops and laptops (see for e.g. Harmon, 2002). It needed to address the record labels' skepticism and concern about security if it wanted access to their catalogues. But while FairPlay presented some of the same restrictions and limitations of DRM that came before it, I argue that Apple's proprietary technology was just one way (and not even the most important) of prescribing user behaviour. FairPlay represents one stone on a path that sought to transition users from the kinds of hard technological locks other companies were imposing to more integrated and quiet forms of control through the store's design.

All files purchased from the iTunes store came in a protected AAC (advance audio coding) format. FairPlay prevented users from burning songs to more than a certain number of discs (as part the same playlist), transferring tunes to other computers and converting files directly into unprotected formats like mp3. Since FairPlay was proprietary, it also meant that only the iTunes software and iPod hardware could read the technology; users could not play FairPlay on digital devices other than the iPod and with other media players like Winamp or Windows Media Player. While these restrictions were similar to other DRM systems discussed already (e.g. Liquid Audio), they were notably more flexible (e.g. users could burn up to 5 copies of a song/playlist). Most users, Jobs argued, would never even run up against the technology's "generous" barriers (Jobs, 2003). In return for this slight imposition, users could enjoy the good "karma" that came from knowing that musicians, labels and producers were being compensated and that the RIAA was not going to be knocking at their door (Jobs, 2003).

While FairPlay was relatively lax compared to other DRM systems, the technology still governed the overall usability of the digital music commodity. When users purchase a CD, they are relatively free to use it how they see fit (e.g. play it in any number of machines, copy it for backup, etc.) There are regulations about how many times a CD can be copied but these are generally hard to enforce, at least when one is engaged in private, non-commercial copying. In this respect, FairPlay was far more limiting since each digital music file came with code that tethered the music to a specific set of uses and devices. FairPlay ensured that songs could only be played on iPods and through iTunes. Regardless of how generous Apple believed its system to be, music in the store came with an implicit assumption: the purchases will work so long as you use Apple products. This enforced interdependence has led individuals and governments to launch lawsuits against Apple. Critics charged that Apple's use of DRM enforced a monopoly relationship between particular software and hardware (like with iTunes and the iPod) and that the practice was essentially anti-competitive ("iTunes User Sues Apple over iPod", 2005; "French Bill Threatens iPod, iTunes Exclusivity", 2006). These charges, regardless of what the courts ultimately decide, underscored the fact that the commodification of digital music has involved an unprecedented push towards tethering music to the network of technologies used to purchase, manage and play it.

DRM not only regulates the kind of software and hardware that can access any given file, it also structures listening and collection practices. The consequences of such technologies are not just in the short-term limitations they impose, but in the long-term restrictions they build into a user's library. Customers who purchase DRM encoded music only "own" digital music so long as the provider from whom they received it continues to support and update their technology. This may sound histrionic, but the examples of the MSN music store and the Yahoo Music store suggest otherwise. Both stores relied on DRM that verified files before letting users play them. MSN and Yahoo encrypted their files with digital "signatures" that allowed them to be played only on particular machines (i.e. those of the file's owner). After a few years of limited success in the market, both stores closed shop. In doing so, they left their customers with music files that soon became obsolete (Burkart, 2008, p. 249; Sorrel, 2008; Van Buskirk, 2008c). With the stores out of business, the music could not be verified or played. DRM not only tethers users to a particular brand of software player or portable hardware player, it tethers them to having a certain kind of technology always present to unlock the DRM. There are technical work-arounds to these kinds of DRM, such as burning the purchased song to a disc and then re-importing it as an mp3. But these methods take time and effort and ultimately degrade the sound quality of a file. DRM technology thus implicitly discourages its own circumvention. More explicitly, legislation like the DMCA (U.S.) enshrines circumvention of DRM as a punishable offense.

Gillespie (2007) argues that this kind of wiring shut with DRM and trusted systems has drastic "material, economic, cultural and […] democratic consequences" (p. 57). DRM employs technology as a regulatory strategy, leaving consumers and citizens with little ability to debate it (Gillespie, 2007, p. 10). Jonathan Zittrain (2008, p. 106) similarly calls out DRM and the various "tethered appliances" — devices whose use is highly prescribed and limited by proprietary controls — that arise as a result. Not only do these appliances restrict user rights and set a dangerous legal precedent, they run counter to the creation and proliferation of "generative technologies" (Zittrain, 2008, p. 70). Zittrain (p. 70-100) sees the latter as essential components of the Internet's future because they are neutral and open platforms that invite and encourage innovation and uses not intended by the creator. Like Illich's (1973) convivial tools, generative technologies allow users to create what they need through technology, rather than be subservient to a device's prescribed uses. In this respect, buying digital music at the iTunes store or other outlets that support DRM was not the same as buying music in other formats. Rather, it was a statement that implicitly supported a certain vision of selling music; one that placed greater limitations on the form and the function of the digital music commodity. Music at 99¢ came with its fair share of trade-offs.

In their quest to make the digital music commodity profitable, those investing in DRM technologies and trusted systems made music far less usable than it had ever been. Never before had the music commodity come with so many restrictions. When users purchased CDs, tapes or records, they "owned" the album in perpetuity and were afforded a wide range of rights with that media.[16] Users could play previous formats where they wanted, as many times as they wanted. These formats may have degraded over time and through use, in which case the commodity lost its use-value or needed to be repurchased/replaced. Digital files do not suffer the same kind of loss and degradation. They are subject to hard drive failure, accidental deletion, viruses, and other challenges but the format maintains its integrity regardless of how many times it is played. DRM enforces control over this unlimited ownership by restricting the number of plays or the context of plays. DRM initiatives, such as those mentioned above, were more concerned with ensuring music was secure than they were about trying to create and sell a desirable commodity. But the drive for complete control and protection over the commodity ran counter to a digital music product that was widely compatible across a number of different players and devices. Not to mention, since DRM only applied to people who were paying for digital files, DRM came with a kind of twisted logic that penalized users for doing the "right" thing. Embedding DRM in files that customers purchased was like a teacher yelling at the five students who showed up to class about how attendance needs to be better. It was a way of punishing the very people that were supporting the music business while giving non-paying customers even more incentive to continue pursuing non-commercial alternatives.

[16] The intricate nature of mechanical and publishing rights complicates the idea of ownership, even for analog forms of the music commodity. Previous formats did come with a number of rights (Right to First Sale, etc.) that provided relative balance between producer and consumer (Burkart, 2008, p. 247).

While the evolution of the music commodity in the late 90s and early 00s fuelled impassioned criticism (Gillespie, 2007; Lessig, 2004; Vaidhyanathan, 2003; Zittrain, 2005), the debate around DRM is abating, at least in some respects. The iTunes store, for example, recently stopped using FairPlay.[17] As of Jan. 2009, all songs in the store were provided in unprotected AAC format, as opposed to AACs embedded with FairPlay technology. They no longer had any technical restrictions on their use; users could burn as many copies of the songs as they wished and convert files to other formats like mp3 (Apple, 2003a). The move was likely prompted by competitive pressure from Amazon and a number of other digital retailers that had begun selling their music without DRM technology. Recording labels that once refused to license their content without DRM have changed their tune. They seem to have realized DRM was doing more harm than good, or at least decided that DRM was not particularly effective at enforcing the particular forms of control they were seeking when they first implemented the technological fix.

This is not to suggest that DRM is passé or no longer important. The publishing, broadcasting, and film industries are currently working through their own DRM crises as they attempt to figure out a viable model for selling e-books and video content online (e.g. Amazon sells its Kindle e-books in a proprietary format that can only be viewed with Amazon's software). Furthermore, as Burkart and McCourt (2003) point out in their discussion of the celestial jukebox, there are other kinds of practices that "lock" consumers in to specific technologies. While DRM provides physical or technical locks on digital goods, customer relations management

[17] It is unclear how much Apple ever wanted to include DRM in its store in the first place and to what extent the record labels pressured Apple for some kind of secure file format (Jobs, 2007).

(CRM) is a subtler strategy that involves the collection of massive amounts of user data, purchase preferences, and customization options that are generated during digital transactions (McCourt & Burkart, 2003, p. 94). This personal information is sorted, analyzed and presented back to the customer as part of the appeal of a given digital music service (McCourt & Burkart, 2003, p. 94). CRM technologies not only have implications for surveillance (McCourt & Burkart, 2003, p. 101), they create consumer dependencies since it becomes more and more difficult or time-consuming to switch to other systems. Switching comes with a cost to the user of having to regenerate all the data they had built up through the previous service.

So while DRM as a technological fix may be less appealing than it once was for the music industries, music as software still relies on a network of technologies to make it playable. It is through these affiliations that "locks" continue to exist. Instead of digital rights management, a kind of digital lifestyle management is arising in its place. Just as Apple's marketing campaigns position their products not as computers or mp3 players but as 'digital lifestyle' devices for media creation and playback (Knopper, 2009, p. 166), Apple has used the digital music commodity as a way to expand its reach over the commodification of the music experience more generally. Whereas companies like Cerberus, SightSound, and others focused on controlling the flow of music by "owning" certain legal or technological aspects of the digital music commodity, Apple's strategy was a re-engineering process that worked on the technical, cultural, economic and aesthetic elements of the digital music experience. Their DRM technology was secondary to the digital lifestyle management they incorporated in the store through its interface, navigation, pricing strategies, and modes of organizing music for consumption. It was through these features that

Apple set out its vision for the digital music commodity and embedded the iTunes store and its related technologies into the everyday practices of music consumption.

INTEGRATED INTERFACES

Considering the fragmented state of the music retail sector, online and offline, that characterized the late 90s and early 00s (Zentner, 2008), the iTunes store solved a particular crisis at a particular time. It was an attempt to resolve experientially the challenges posed by file sharing and the mixed economy surrounding music. It took the confusion and complexity that went along with finding, buying and playing music online at that moment and tried to repackage these practices. This is a textbook example of what researchers in the social studies of science and technology call a "black box" (Latour, 1987, p. 2-3). Black boxing is a process of technical design where the "assembly of disorderly and unreliable allies is thus slowly turned into something that closely resembles an organized whole…It is made up of many *more* parts and it is handled by a much *more* complex commercial network, but it acts as one piece" (Latour qtd. in Gillespie, 2007, p. 53). Apple's system hid all the wires and guts of the music consumption experience and presented it instead as a seamless unity. As one of Apple's head designers explains:

> A lot of what we seem to be doing […] is actually getting design out of the way. And I think when forms develop with that sort of reason, and they're not just arbitrary shapes, it feels almost inevitable. It feels almost undesigned. It feels almost like 'well of course it's that way, I mean, why would it be any other way.' (Jonathan Ive Senior VP Industrial Design, qtd. in Hustwit, 2009).

From a designer's perspective, it is a question of intuitiveness and user-friendliness. From the perspective of an emerging market, Apple's design decisions actually smoothed over many of the complications and contradictions of finding and buying digital music (i.e. DRM, competing formats, price, business models, etc.).

Like Winamp's interface, the layout of the iTunes store draws on skeuomorphs and other cultural conventions that came before it. Users can rely on traditional "brick-and-mortar" retail categories (e.g. "Top albums", "New Arrivals", "Singles and EPs", "Genre" etc.) or check out some uniquely digital musical groupings (e.g. "Playlists", "Exclusive Tracks", iMixes, etc.). However, the whole idea of "interface" is complicated by the store's networked nature. The iTunes store is only fully understandable through the software and hardware with which it interacts. Whereas Winamp's interface was a relatively stand-alone application, the iTunes store is connected to both the Internet and other technologies. Apple erases or at least masks the boundaries between these various connections, a process that ultimately affects how users encounter and perceive the digital music commodity, and how they engage in their everyday listening practices.

Graphically speaking, the iTunes store was an extension of the iTunes media player. Launched in Jan. 2001, the iTunes software jukebox may not have been as flexible or easy to customize as other players (e.g. Winamp), but iTunes combined all of its key features in one main window.[18] Users could see the list of songs in their library, playback controls (play, rewind, fast-forward), a display that flashed metadata, and a sidebar with access to playlists all in one glance (see Figure 10). Despite being warmly received at the launch event, iTunes only began its wider diffusion 10 months later in Oct. 2001, when Apple introduced the iPod (Apple, 2001). Apple's

[18] Rather than starting from scratch, Apple purchased technology and intellectual property from a software company called Casady & Greene, publishers of the first popular Mac-base music player, SoundJam MP (Clark, 2003).

portable music device was initially mocked (Hartley, 2009a; "The Meaning of Ipod," 2004), but it soon became the hottest selling piece of consumer electronics since the Sony Walkman (Kahney, 2004, p. 13). Apple's stock price doubled in the period between 2000 and 2005 and rose sharply by almost 600% after the introduction of the signature device (Reppel, et al., 2006, p. 239). By 2006, the five-year old iPod held over a 75% share of the portable music player market with over 60 million devices sold (Levy, 2006; Reppel, et al., 2006).

Figure 10 – iTunes Media Player (July 2001)
The early version of iTunes was a simple interface, but it combined all its information in one main Window. Image retrieved from the Internet archive version of apple.com.

I mention this rapid growth not because I want to further fuel discourses about an "iPod revolution" that saw an "iPod generation" furiously investing in a device that "changed everything" (Hartley, 2009a; Kahney, 2004; Knopper, 2009; Levy, 2006). Rather, these numbers indicate how the rise of the iPod acted as a perfect vehicle for the spread of the iTunes media player. Since Mac users could only load songs on their iPods using iTunes, more iPod sales meant more iTunes users. The iPod was a physical and portable extension of a user's music library that was designed to work seamlessly with the iTunes software. As millions of users flocked to a new portable device for managing their music on the go, they simultaneously became users of new software that organized, sorted and presented their music collections.

Importantly, when Apple launched the iTunes Music Store in 2003, it did so as a revision to the iTunes media player. This is worth noting, and potentially surprising, since Apple had already established an online retail presence with The Apple Store. Since 1997, the Apple Store had been (and continues to be) a place for Mac users to order software and hardware online (Evans, 2007). The store had an in-depth e-commerce framework, not to mention advertising and promotional campaigns already underway. Apple could have incorporated the sale of music into the Apple Store; music could have been one of the many commodities available there. Instead, Apple chose to insert the music store into the iTunes media player software, an update that came during the release of iTunes version 3.0. By installing the update, thousands of jukebox listeners and iPod users instantly became potential digital music customers. Only iTunes users could access the iTunes store and, because of the FairPlay DRM, songs purchased from the store could only be played through iTunes or iPods. Even users who visited the iTunes or Apple websites online or who saw an ad for a song available in the store on a third party website would be redirected to enter the iTunes store through the software as opposed to through a browser (see Figure 11).[19]

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[19] Early PC users who bought iPods had a slightly different experience since they were given a free copy of MusicMatch jukebox instead of iTunes. This hybrid alliance between the iPod and MusicMatch Jukebox ended when Apple launched the iTunes music store. If Apple was

Figure 11 – The iTunes Music Store (October, 2003)
The iTunes Music Store was embedded into the media player, allowing for an integration of listening and buying. Image retrieved from the Internet archive version of apple.com.

At the time, this tight integration between the store, the software, and the hardware was in stark contrast to most other online outlets. Most digital retailers had separate websites for users to visit while shopping. Buying music at these "stores" was not much different than shopping at your local record store; the act of browsing and purchasing music were distinctly separate from the act of listening. With iTunes, Apple embedded the store *within* the software. They fused typically separate moments of the consumption process. Instead of having to open a web browser, surf to an online store and purchase music, users could visit the iTunes store without ever leaving the media player's interface. This is the equivalent of combining a fridge,

going to be in the business of selling music, they wanted to make sure they controlled all aspects of that process.

a grocery store, and the very dinner table upon which the food is served. Technically, the store was a web browser that opened within the iTunes application. The store's contents were hosted remotely and only visible with an Internet connection. However, Apple's design slight of hand ensured that listeners could browse their music and music from the store all from the comfort of one program. This may seem like a trivial detail now, especially since it echoes the promise of all Internet retail — shop without leaving your home! — but the difference is that iTunes allowed users to shop without ever stopping the very activity in which they were already engaged. By merging the store and the player, and by giving them a physical and portable expression through the iPod, Apple combined the act of shopping for and buying music with the acts of sorting and listening to it.

Because the store is embedded directly within the consumer's music playback application, the software has numerous technical and design links that facilitated smooth and recurring movement between the contents of the store and a user's library. Since the store and the player share the same overall interface, there is a much quicker learning curve for users making their first visit to the store. The search box that finds files in a user's personal library, for example, is the same one users employ to find digital products for sale in the store. Additionally, when users sample songs in the store, it plays immediately within the iTunes software. Playing and finding digital music within your personal library becomes synonymous to the activity of playing and finding music for purchase. If a user does decide to purchase a song, they can click on a grey "buy song/buy album" button and their purchase — if they've set an account up with iTunes by credit card — is downloaded to their library in one click.[20] It is an innocuous button, and one that now seems commonplace in online transactions. But it hides the details of payment and commerce and makes the physical act of paying for music nearly invisible. In an era where millions of digital music users were accustomed to downloading their music for free, Apple design strategies tried to mask, or at least downplay, the act of paying for music.

The "buy song" button housed within a store that is itself housed within a personal music jukebox represents an advanced blending of leisure and consumption that is possible in the digital realm. It is a subtle reminder that digital music is a commodity like any other. This logic is perhaps most evident in the hyperlinks that appear beside each and every song in a user's library. Whether purchased from the iTunes store or not, every artist name, song or album title that appears in a user's music collection has a small grey "Quick Link" arrow beside it (see Figure 12). If clicked on, this link takes users to the iTunes store. For example, the link beside the list entry for Duran Duran's "Electric Barbarella" pulls up the Duran Duran Artist Page in the iTunes store and directs users to their album *Medazzaland*. Technically, the links traffic users back and forth from the personal library to the store. Symbolically, they serve as reminders that our libraries are constituted by commodities. Regardless of how the user obtained the songs that make up their libraries (i.e. burned from discs they owned, discs of friends, file-sharing networks, online stores, etc.), the iTunes software insists on presenting them as commodities

[20] Apple licenses its "one-click" technology from Amazon (Apple, 2000). The deal is somewhat controversial. Many in the tech community opposed to the idea of business method patents criticized Amazon for patenting something as simple as a click-to-buy button, whose only real innovation was the different use of "cookie" technology (see for e.g. O'Reilly, 2000). Apple's deal with Amazon in a sense legitimized Amazon's claim to the patent, and drew the ire of those already united against Amazon's attempt to patent the very means of digital purchase.

that link to a store full of digital objects for sale. The design of the software is such that every instance of using the player is potentially a visit to the store. Our personal libraries are not just repositories for our favourite songs and albums, they are commodified databases that encourage even further consumption.

Figure 12 – Buy Song and Quick Links (Sept 2004/July 2005)
The Buy Song buttons facilitated easy purchases at the store while the Quick Link arrows (small grey buttons on the right of each column) allowed for traffic between a user's personal library and the store. Image retrieved from the Internet archive of apple.com.

Price, Ownership and Value

This brings us to price, another crucial piece of the store's offering (Jobs, 2003). Apple hoped that setting a price of 99¢ a song and $9.99 an album was high enough to start generating revenue for digital music yet low enough to appeal to customers who were getting accustomed to "free" music. Even though the original Napster had folded before the iTunes store launched, it was unclear whether or not the existence and popularity of the service had literally devalued music to the point that it might never be possible to charge for it again. Napster and its legacy, some believed, had occasioned a "breakdown in common-sense assumptions about the status of music as a property" (Friedman, 2005, p. 195). Apple's pricing decision, then, had more than just commercial implications. It was tied up in larger questions about value and ownership in the age of digital music. Apple's price was an attempt to navigate different conceptions of how goods should circulate on the Internet and various ideas about how users relate to digital music.

At the time of its launch, Apple's "99¢ solution" was in stark contrast to the subscription models other online music providers were pushing. Both PressPlay and Rhapsody offered subscription models where consumers paid a monthly fee for access to all the music in a store's database. Users could access millions of songs for a price that hovered around the cost of one CD per month. With subscription services, consumers were essentially renting the music since they could not access any of the songs if they cancelled their membership. They only "owned" the music if they paid an extra premium for the individual songs or albums in question. Subscription models, of which several still exist, continue to have a reasonable user base but they have yet to match the iTunes store's commercial success (this may be changing, as I discuss in Chapter 5).

The iTunes store, on the other hand, charged users a price per purchase, be it a song or an album or a playlist. Much like the relationship with a traditional record store, consumers only paid when they made a purchase, not on a monthly basis. The model is founded on the assumption that "owning" music is still a relatively ingrained social practice. At the iTunes launch event, Jobs reached back through a century's worth of commercial recorded music history — conveniently skipping mixed tapes and CD burning — to argue that people want to "own" their music:

> People have bought their music for as long as we can remember. […] we think people want to buy their music on the Internet by buying downloads, just like they bought LPs, just like they bought cassettes, just like they bought CDs. They're used to buying their music and they're used to getting a broad set of rights with it. When you own your music it never goes away." (Jobs, 2003)

Jobs' hunch was that while consumers were ready for the new format of digital music, they still had beliefs about acquiring and consuming music that were not simply going to disappear in light of new technology. Despite the somewhat intangible nature of digital files, Jobs argued they were still commodities that users wanted to own.

Initially, Apple's *a la carte* solution reinforced traditional models of ownership. But the way Apple implemented its 99¢ solution opened up questions of how "value" typically gets ascribed to the music commodity. Whereas most music retailers traditionally set their own prices — prices that usually varied based on the expected popularity of an album, its new-ness, the status of the artist in question, etc. — Apple chose a one-price-fits-all model. Regardless of stature, celebrity, or style, every artist appeared on the iTunes store for the same price. Bob Dylan, Luciano Pavoratti, Celine Dion, The Born Ruffians, and my friend David Myles: all 99¢. These artists may have been "worth" different things to different customers, but the lack of price fluctuation suggested that they were equal, at least economically (album prices did vary, though minimally). The fact that an unheard of independent thrash metal band could sell their song for the same price as a Rolling Stone's classic was, in many senses, wonderfully egalitarian. In fact, the Future of Music Coalition — an organization dedicated to protecting the interests of independent musicians — called the site's re-sale policy exactly this in its review of the launch (Thomson & Zisk, 2003). The original iTunes store charged no premium for skill, popularity, or longevity; all artists played on the same 99¢ field. Since all the music files Apple was selling were, essentially, megabytes of information, the iTunes store positioned itself as a neutral purveyor of data and charged everyone the same price of transfer.

For proponents of new models of digital capitalism (see for e.g. C. Anderson, 2006, 2009; Leonhard, 2008), this "egalitarian" presentation goes hand in hand with the promise of digital music to disrupt the business of music production and distribution more generally. No shelves and warehouses mean fewer physical limits to the amount of products digital stores can offer. This is the crux of Anderson's (2006) Long Tail theory of commerce on the Internet. Lower barriers to getting products in the store should also mean an increase in quantity and diversity of cultural products available. Producers of goods can be in direct contact with their consumers, skirting around the costs and limitations imposed by traditional intermediaries. It is an optimistic outlook, though it rests on a deterministic view that assumes new technology is all that is needed in order to level the playing field between producers and consumers in capitalist markets.

Even on iTunes — which launched with 200,000 songs and now includes over 10 million tracks — the challenges of "shelves" and intermediaries still remain. Not only are there technical limits, such as server size, bandwidth, and the number of connections the store can accept, there are design problems with how to accommodate such a wide range of music. Limitless content in theory cannot be presented as limitless in practice. Despite the amount of music the iTunes store holds, it has a relatively small "space" within which to display its contents. Apple and other digital retailers must make choices with regard to the content they offer. These decisions affect the images and links that appear on the landing pages and structure each visit to the store. While the 99¢ price may exert a leveling effect, the landing pages act as digital shelves, giving prominence to certain artists and presenting only a select number of total titles and artists (i.e. 30 to 40 thumbnail images, double or triple this if you start scrolling through the various widgets).

There are also structural barriers for independent or emerging artists trying to make a name for themselves on the iTunes store. At the time of its launch, the store did not include any content from independent artists. Apple lacked the resources to deal with small-scale transactions and individual musicians and labels. Even now, Apple only deals with record labels of a certain size. Smaller, independent labels can only access iTunes by joining an indie label aggregator like CD Baby or The Orchard. Instead of a disintermediation, electronic markets simply bring new intermediaries or new roles for old ones (Bailey & Bakos, 1997, p. 12). This is not to suggest there are not benefits for smaller artists and labels. Rather, it is to point out that the assumption that long tails automatically equal greater diversity and opportunity needs to be put in the context of the industry's existing political economic structure. Assuming that new technologies will inherently alter the balance of power in an industry downplays the power afforded to entrenched players in various fields, especially when dealing with access to cultural commodities. Despite the promise of an "egalitarian" pricing scheme, not all artists are equally likely to be found or heard in the iTunes store. iTunes has a marketing and affiliate program known as iTunes 360, which Apple describes on their website as "a great way for content providers to increase their advertising budgets and maximize sales". Although Apple's official policy suggests it does not favour any particular provider, it is clear that it will play favourites if it helps increase sales to the store: "APPLE shall have the right to determine which sound recordings, irrespective of any particular record LABEL or label affiliation, would best further the commercial purpose of the Online Store, and to promote such sound recordings more than others" (Apple, 2005). Although this could, in theory suggest all artists have an equal chance to be featured on this site, as it is in other spheres of production and distribution, marketers with the biggest budgets shout the loudest. The long tail of the iTunes store is an incredibly crowded marketplace. The benefits of the digital store's lower cost of entry and greater potential audience bump up against the increased competition artists face just to be heard.

Apple's 99¢ model offered a different perspective on music's value, one that was potentially leveling for artists but one that was still intimately tied to the wider conditions of publicity and production that govern the music industries. Recently, in conjunction with dropping their FairPlay technology, Apple relented on its one-price-fits-all stance (Jan. 2009). The store now sells songs at a variety of prices (e.g. 79¢, 99¢, $1.29 per song and "virtual" bargain bin albums for under $5 or $6). The move to variable pricing was a welcome change for the major music labels. They had increasingly argued that Apple was exerting a stubborn monopoly over the market that left them with little flexibility over managing the sale of their commodities (Leeds, 2005; Warner Music Ceo Calls Itunes Pricing Unfair," 2005). Moreover, critics worried that Apple's standardized pricing (at a relatively low price) was ultimately eroding the value of music. Apple was treating music as cheap software to drive sales of more profitable goods (Bangeman, 2005; Leeds, 2005). It was a side interest, or what businesses call a loss leader: a commodity that draws users in and steers them towards more profitable goods and services. Apple, for its part, has always been coy about the amount of profit it makes from the music store (Cherry, 2004; Hansell, 2008; Orlowski, 2003). Given the amount of money they turn over to copyright holders — approximately 70% of each 99¢ — it is unlikely the music store has been a huge revenue generator for the company. Furthermore, iTunes is hardly the only music retailer that treats music as a side interest. Big box discount stores like Target, Wal-Mart and the like have been steadily lowering the price of music over the past decade. This strategy helped them to become the biggest music retailers of music and displace many of the smaller and dedicated music-only retail shops. With constant sales and discounts, these retailers have done just as much as Apple to rob music of its former exchange value.

Ultimately, the price Apple charges for music is only tangentially related to its value. Ownership and value are not just about the price users pay for music, or the means through which they acquire it (i.e. subscription vs. *a la carte*). Ownership and value are also linked to the nature of the relationships we form with the commodities around us and what we can do with them. Burkart (2008) recounts a conversation with Gillespie in which they discuss that there are really two kinds of ownership at play with music. The first is financial ownership of the music commodity: I bought this, therefore it is mine and I can do what I like with it. The second, and more interesting, is what Gillespie calls cultural ownership. This music is part of my collection, it is part of who I am; I should be able do what I like with it (Burkart, 2008, p. 249). Value, for users, comes from both. But cultural ownership is clearly the more affective relationship between a person and their commodities. Since our relationship with music is as much cultural (i.e. it is wrapped up in identity, taste, pleasure, etc.) as it is commercial, it is possible to feel intense ownership over something for which we have not paid. The price for which we acquire music is simply one among many pieces of the overall value we find in objects. This is precisely why the previous cases I have looked at have only marginally involved price and sales and have focused on other loci for affective relationships with our commodities. It is also why Sterne (forthcoming, 2012, p. 385-396) argues that a narrow focus on the economic aspects of the digital music commodity (i.e. how it will sell, how much should it cost) provides only a fraction of the story.

The problem in the digital realm, as Burkart points out, is that the new retail business models and economic imperatives that drive digital music's circulation may ultimately run counter to the social and cultural gratifications we seek from music (Burkart, 2008, p. 249). Users of digital music find value in its unique properties: its search-ability, its portability, its accessibility and so on. Whereas with a physical record or CD, the collector's fetish is satisfied through packaging, album art and other tangible elements of the commodity, the sharing and hoarding of digital files become key sources of user gratification (Burkart, 2008, p. 248; McCourt, 2005, p. 251). Value derives from how users use their libraries, personally and with others: "The value comes in communication and sharing cultural objects, and ideas and information about them" (Burkart, 2008, p. 246). Unfortunately, as Burkart notes, the commercial technologies that facilitate digital music acquisition and playback often make the realization of this value impossible, or at least always perpetually unattainable " (Burkart, 2008, p. 247). Thanks to DRM or to the conditions of subscription services, most digital music retail outlets limit users' rights to music (right of first sale, personal use rights, etc.) and replace them with strict and conditional end user license agreements. Subscription services reinforce the hoarding aspects of digital music but then trouble it by never giving users full control over their libraries. *A la carte* models offer users ownership over the commodities they purchase, though they are still governed by license agreements and proprietary technologies. In the "technology regime", as Burkart (2008) calls it, "the introduction of usability issues" continually undermines the value and ownership of digital music" (p. 247).

The truth is the music commodity has, at least since the arrival of tape, never been something that could *only* be acquired through purchase. The same is true today. For the foreseeable future, the digital music commodity will be available for "free" and for a price. In addition to file sharing sites where users can own music without purchase, there will be streaming services where they can hear music but not control it, subscription models they can manage but never truly own, and *a la carte* download stores where they can own music but still face limits in its usability. Apple's 99¢ model will be one among many models for accessing digital music. The price they charge is as much an advertisement for the act of paying for digital music as it is about the cost of a good. By giving music a price, by presenting it in a store in a manner that is both familiar and new, the store tries to re-instill traditional models of ownership and value using new technologies. The 99¢ solution is further evidence that the music commodity was never really disrupted, there were simply different visions of selling and buying music that were circulating.

PLAYLISTS

If value and ownership depend as much on what you can do with a given commodity as on its price, then the way the iTunes store groups and sells music is worth a closer look. Digital formats promote what some scholars call a *disaggregation* of music (Bakos, 1997; Drew, 2005). Although this seems to pose challenges for the integrity of the album as form of the music commodity, Rob Drew (2005) suggests that new modes of presenting and retailing music *reaggregate* it into new types of commodified packages. iTunes achieves this most prominently through playlists. Apart from grouping songs by album or by artist, as one might find in traditional retail stores, Apple sorts and sells much of its content through designed and curated playlists of related content. There are seasonal playlists (e.g. the iTunes Essential Halloween Mix featuring songs about werewolves and other monsters - $24.75), yearly reviews (e.g. the "Best of 2009" songs playlist - $86.76) and iTunes Essentials (e.g. Essential Bob Dylan - $71.28). Starbucks and Nike both have partnerships with the store that let users browse through some of Starbucks' favourite café music (e.g. Playing for Change: Songs from Around the World, $14.99) and Nike's motivational sports/workout mixes (e.g. My Best 10K mix, $9.99). In addition to playlists from Apple and its partner companies, there are hundreds of "celebrity" playlists — lists of songs compiled by well-known media figures.[21]

[21] As Dan Kois (Kois, 2004) points out in his hilariously titled article, "Beyoncé, Your Mix Tape Sucks", celebrity mixes range from tasteful to absurd. Kois is particularly incensed by the fact that over half of the 14 songs on Beyoncé's celebrity mix are by the pop diva herself, her relatives, or her former bands. Kois notes that celebrity playlists are rarely put together for any kind of musical value. Rather, they are simply another venue in which the celebrity can spread their brand.

Apple also lets users participate in the playlist process through the use of iMixes: user-created playlists. Like celebrity playlists, iMixes vary widely in their range of quality, purpose and cost (e.g. The Seductive Mix - $38.22, Time to Chill 17 - $19.80, and Frat Party 80s Style - $19.41). Users can create a playlist in their iTunes software using songs from their library or from the store. iTunes then bundles the mix into a playlist and makes it available for other users to listen to, vote on, and purchase. At the start of 2010, there were around 2 million iMixes that had received 8 million votes. While users create and vote on iMixes for a variety of reasons – self-expression, fun, fame, identity negotiation, etc. (Drew, 2005, p. 547) – the end result is a re-aggregation of songs that Apple integrates into its retail offering. Users compile the mixes and Apple resells them.

Playlists and user-created mixes are hardly a practice exclusive to the iTunes store or other digital retail outlets (Drew, 2005). Compilation albums and mix tapes have a long history and the new kinds of playlists on the iTunes store — the personalized mix, the branded mix, the celebrity mix and the user-contributed mix — all borrow from older forms of mixes (Drew, 2005, p. 537-542). The difference, as Drew (2005) points out, is that these new forms of commodified mixes are increasingly encroaching on previously uncommodified practices. Home-taping or making mix tapes for friends were once seen as activities outside the industry or even activities that record labels actively sought to limit or restrict (McLeod, 2005). Instead, iMixes represent an attempt to profit from a previously unsanctioned consumer practice (Drew, 2005, p. 543-546). Users may have a myriad of reasons for creating an iMix, but Drew notes that they are still performing immaterial labour in service of selling more songs. Echoing Terranova (2004), he argues the iMix:

> commodifies a practice that music fans have enjoyed on an informal, one-to-one basis for three decades; it puts a price tag on the mix, turns mixers into labourers on behalf of music retailers and record labels; and it corrals the practice of mixing within proprietary digital formats and confines it to the limited repertoires of particular music retailers. (Drew, 2005, p. 549)

Just as the CDDB benefited from the public contributions of users to their privatized database, iTunes employs users as curators and packagers of digital music commodities. Apple not only benefits from the iMixes themselves (as commodities) but also from the community that forms through the act of creating, judging and consuming those mixes. In other words, it is not just free or immaterial labour (Terranova, 2004) at play; the iTunes store incorporates what Mark Coté and Jennifer Pybus (2007) call immaterial labour 2.0: profiting from "the networks that people construct and participate in" as well as the sale of individual goods (p. 99). iTunes' community of labourers is a particularly valuable one since, like the obsessive updating of user profiles that goes on in social networks, iMixes need continuous tending to reflect the ever-changing identities of those who create them. The result is a constant supply of repackaged user-generated commodities.

Apple's grouping and regrouping of digital files extends the commodity logic of the music product. It represents the "morselization" of digital data into ever more sellable bits (Gillespie, 2007, p. 55-56) as songs on the iTunes store are sold individually, as part of an album, or as part of a playlist. In the digital realm "one album becomes a long shelf of songs and products, each carrying its own release date, distribution path, and price tag" (Steuer, 2006). A user may not be interested in buying the "Final Countdown" (99¢), by the band Europe, but they may consider buying the "Definitive 80s" playlist ($34.99), which, incidentally, includes the former track. Playlists are presented as a new, or inherently digital, way for consumers to experience and discover music. But at the iTunes store, they are also a way to splinter the music commodity into multiple products. If music has traditionally been a commodity that is generally purchased once and consumed often (Lacher & Mizerski, 1994), Apple's playlists act as an attempt to sell the commodity multiple times in different contexts.

This strategy was recently taken to the extreme when Apple partnered with British rock band Radiohead to exploit the unique properties of the digital music commodity (Kreps, 2008). Radiohead had long opposed having their music on the iTunes store (Huhn, 2006). They argued they wanted to have control over the sale of their music and that Apple did not allow enough flexibility (Huhn, 2006; Van Buskirk, 2007a). However, as a special promotion for the single "Nude" from their album *In Rainbows*, Radiohead offered users 5 different "stems" of the song through iTunes in April of 2008. Each stem was 99¢ and had a specific instrument track from the song: one with just the vocals, another with the guitar, one with drums, etc. Users were encouraged to remix the song and post their new version to a website operated by the band. Despite receiving virtually no radio airplay (3 of the 1,289 stations that Nielsen BDS tracked), the song and its various stems were downloaded over 60,000 times from the iTunes store — enough to propel "Nude" into the Billboard "Hot 100 Singles" chart (Cohen, 2008). The song opened at No. 37 for the week of Apr. 7 – 14th, 2008, Radiohead's highest debut single ever, and just shy of their highest position ever on the Billboard Hot 100 (Cohen, 2008).

Radiohead had already made headlines with *In Rainbows* by offering the entire album for digital download on a "pay what you wish" scale in late 2007. It is unclear how many of the millions of users paid for the album, but sales of the digital version of the album eclipsed all other digital sales of Radiohead albums (Morrow, 2009; Van Buskirk, 2008b). When they released the album in (physical) retail stores in January 2008, 1.75 million fans bought the CD and over 100,000 fans bought copies of a deluxe box set version of the album (Van Buskirk, 2008b). With "Nude" on iTunes, thousands of users were then spending $5 to participate in the remix project. Not to dwell on these already over-hyped marketing initiatives, the point here is that the variety of ways in which the digital music commodity can be grouped and splintered represents a means of charging consumers multiple times for the same product. Radiohead's initial resistance to appearing on the iTunes store was because they refused to sell songs individually; they wanted to keep the album, as an artistic statement, whole (Van Buskirk, 2007a). It is interesting that what finally brought Radiohead onto the iTunes store was the complete implosion of their music; their sound separated out not just into individual songs, but its component pieces.

Playlists, then, are meta-commodities. They are commodities that rewrap individual commodities into a new bundle under the assumption that the whole is, in theory, greater than the sum of its parts. While this kind of organization was possible before with compilation albums, singles, remixes and the like, the digital playlist engenders a kind of never-ending reflection on, and regeneration of, the music commodity. Each new ordering encourages a subsequent re-ordering. Each playlist puts old commodities into new contexts, offers consumers multiple ways to purchase the same product, and gives users another chance to participate in the process of commodification. From Radiohead's "Nude" stems to user-generated iMixes, playlists have expanded and exploded the form of the music commodity. Hardly a case of the death of the album, the splintering of the digital music commodity into single tracks has created a multitude of repackaging options for music. Single downloads and playlists have not supplanted the album as a means of ordering music, and why should they? All of music's various aggregated forms can happily co-exist as complementary avenues that support the purchase of digital music.

BUY SONG

iTunes is not just a specific application for the playback and purchase of music; it is yet another interface that mediates our relationship with digital commodities and shapes the experience of music in its digital form. Through its design, navigation, pricing strategies, and means of organizing music for consumption, Apple sought to inject value back into the digital music commodity and, importantly, into the purchasing process itself. Rather than achieving this goal through strictly technological or legal measures (like Cerberus, SightSound or Liquid Audio), Apple used a multi-faceted lifestyle management approach that played on aesthetic, technical and cultural fronts. From hyperlinks that directed traffic between the songs in a user's library and those in the store to "soft" DRM to seamless one-click purchase technology that allowed customers to charge songs directly to their credit cards, the store's design relied on reducing the distances between listening, consuming and buying. It fused the moments of playback and purchase, and reminded users that music's commodity status was only ever partially in question.

Linked and embedded as it was into music management hardware and software, the iTunes store was part of a larger network of technologies that the digital music commodity enabled. The store relied on technical and aesthetic ties to iTunes and the iPod. Although this kind of technological affiliation was also true of CDs, CD players and CD stores, the difference with iTunes is the degree to which Apple insinuates itself and its products into the music consumption process. In Apple's world, listeners now purchase, store, listen to, and carry music around with one brand. This is digital lifestyle management. It is the commodification not just of things, but also of ways of doing and experiencing. It is the enclosure of music into a wider assemblage of interdependent technologies. It is an attempt to control and commodify ever-greater amounts of the practices related to music. This strategy is not unique to Apple. As the value of, and ability to profit from, the recorded music commodity comes into question, the rest of the music industries are shifting their attention to other aspects of the music experience (i.e. hardware design, peripherals recommendations, touring, etc.). This is most evident in the push on behalf of major labels (and some independents) to sign contracts known as "360 deals": contracts that give record labels a percent of everything an artist does, from recordings to tours to merchandise in exchange for a huge advance (Leeds, 2007). These kinds of deals suggest there is less and less to be made from recorded music, and more to gain from mining and commodifying the overall experience of an artist or brand.

This has implications far beyond music. We need only look at the recent developments of the iTunes store for evidence. During the last four years, the focus of the store has shifted away from music and towards other commodities. In fact, to call the iTunes store a music store is really a misnomer. In addition to music, the iTunes store now hosts (and sells) thousands of podcasts, televisions shows, movies, software applications (apps) and books. The iTunes software has evolved in step with these developments, and it now supports the playback of a variety of media.

The original iPod has given way to a line up of sibling devices; music management is merely one among many functions that iPods and iPhones serve. As with music, all these other commodities are available in a digital store that presents, organizes and sets the contexts for how users experience them. They are embedded within the personal media libraries of millions of users. All aspects of audio-visual leisure are now also, potentially, instances of audio-visual commerce.

My analysis focused on the early development of the music store because this is the moment when Apple most clearly expressed its vision for the digital music commodity (i.e. FairPlay, 99¢, *a la carte,* Playlists, embedded in iTunes, etc.). Although this was only one way of understanding the digital music commodity, it quickly became the dominant means through which people bought digital music. iTunes continues to command 70% - 80% of the digital retail market and over 20% of all music sales (Hartley, 2009a). The strategies they developed to create a viable retail market for music have served as their template for commodifying an entire ecosystem of digital commodities. Through its interface and presentation, Apple sought to rebuild many of the everyday sources of value music listeners were accustomed to. It relied on traditional relations of ownership (e.g. *a la carte*) and channeled collective free labour and "gifts" from users and turned them into new kinds of user-generated commodities (e.g. playlists). With iTunes and its associated technologies, Apple has embedded itself in the music industries and across the music experience. Even users who have never purchased a digital music file still interact with iTunes or an iPod, or some other aspect of Apple's vision for digital music. Through iTunes, Apple has commodified the experience of digital music regardless of whether or not users are paying for the digital music commodity.

CHAPTER 5 – MUSIC IN THE CLOUD

MUSIC ON THE MOVE, AGAIN

If there is a crisis in the music industry, it is not with the declining sales of recorded music. In fact, data from the United States in 2009 seem to suggest that total music sales are actually on the rise (Martens, 2010). Increases in digital sales, touring, and other revenue streams seem to be making up for declines in the sales of physical CDs (Martens, 2010). Although global data suggest this is not the case everywhere, the music industries, as a whole, are finding plenty of sources for revenue growth (IFPI, 2010). The crisis, if we have to use that word, is perhaps more accurately located in the changing relationship people have with music, or the changing role of music in the contemporary moment. The move to music as a digital file has meant an increasing shift to music as software. It is now part of a network of technologies and the singularity of the music experience from previous formats is now blended into a multimediated computing experience. Rather than a commodity of its own, music expresses itself through a number of other commodities and a variety of online and offline services. Phones come with music, as do websites, video games and new cars. CDs are routinely given away in newspapers and magazines as promotions (Straw, 2009). Social networking sites, search engines, and other such technologies use online digital music as a draw for their services. Music appears to be ubiquitous: it is both everywhere and nowhere (Kassabian, 2001).

This abstract ubiquity finds its epitome in the latest digital music trend: the move to music in the "cloud". Although downloadable *a la carte* models like the one pioneered by the iTunes Music Store have thus far dominated the digital retail landscape, we are in the midst of a push towards cloud-based music services: streaming, subscription or other such services that offer users access to massive libraries of music or storage space for hosting their own sound files in places other than a user's hard drive. Imagine a diagram of the Internet showing a vast number of connections between an equally vast number of computers and other networks. The traffic, noise and space between them create the cloud. Instead of relying on users to download and manage music on their computers, these services give users access to songs via the cloud and allow them to connect to it from a number of different web-enabled devices. Part metaphor, part vision for the future business model of music, cloud music is part of a transectorial push to make digital files and personal libraries more readily available for users and more profitable for producers and rights holders.

Highly linked, again, to developments in computing, the shift to music in the cloud further complicates our understanding of the music commodity. The previous cases in this dissertation have, at least to a certain extent, treated the digital music commodity as something that resides locally on the hard drives or devices of users. The analysis has focused primarily on the object-ness of this ownership, on how users manage libraries of folders, fields of metadata, and store-bought digital files through the interfaces of their computer's software. The move to music in the cloud alters this relationship. Rather than owning and keeping music on their own devices, users are outsourcing the creation, maintenance and storage of their music collections to cloud-based music services. Accordingly, this final chapter considers the recent push towards music in the cloud and rise of cloud computing more generally. As the metaphor suggests, the cloud offers an infinite and omnipresent space where music is ever available. With music centrally stored in a huge database, the commodity is highly configurable and manifests itself in countless ways. Although this allows for unique possibilities for the mobility of music and its discovery by users, cloud-based services also act as transient and enclosed spaces where the music we "own" is always at an ethereal distance to us. Music becomes something we access rather than acquire. The push towards cloud music is part of a drive towards a celestial jukebox designed and managed by companies looking to control the shape and flow of the music commodity. Hardly a simple shift from music as a good to music as a service, music in the cloud represents a particular cultural model of music distribution — one that enmeshes users in a network of technologies and a process of continual commodification of the music experience. Music in the cloud is contingent and complementary. Its shape and function are highly dependent on the interfaces and devices that actualize it. Music in the cloud integrates music into so many diverse services that it becomes difficult to talk about music as a specific experience at all.

Cloud Formations

In an astute article about compact discs, Straw (2009) discusses the declining cultural relevance of the CD commodity. He uses the example of counterfeit CD manufacturers in Mexico to launch an extended analysis of how form and format are deeply entwined. Throughout most of the 1990s, counterfeiters were highly concerned with mimicking the exact details of the CDs they were pirating (Straw, 2009, p. 80). They sold copied music and it was important that they sold it in intricately copied packaging. The replication of the commodity's packaging and paratexts was just as significant as the replication of the CD's content. Graphics, liner notes and the rest were all meticulously counterfeited, suggesting the pirated music's worth came not just from the discount prices, but from the fact that the commodity context remained intact despite its move to an illicit market. Around 2005 though, this practice "mutated" (Straw, 2009, p. 80). Instead of copying the commodity in its entirety, counterfeiters began using compact discs as mere vessels on which to store as much digital music (usually in mp3 format) as possible (Straw, 2009, p. 80). Whether or not this was a signal of the compact disc's diminishing cultural force, or part of its cause, it was evidence the CD had "lost its integrity as an artifact" (Straw, 2009, p. 87).

For Straw, the "end" of the compact disc is a function of the CD technology itself. As CDs evolved and co-mingled with computers, they became as much of a storage technology as one of presentation. The CD's storage capacity — which was initially one of its key benefits over vinyl or tapes — was also part of the reason newer technologies with greater capacities displaced it (Straw, 2009, p. 82). Although the CD provided important paratextual information that in some ways rivaled previous formats of the music commodity, function ultimately superseded form. As it evolved, the CD became increasingly mobile thanks to portable CD players, car stereos and, eventually, computers (Straw, 2009, p. 86). Users left the CD's paratexts behind as they brought the plastic discs into new environments and contexts. Enmeshed with computers, the CD lost some of its importance as a format for music. Music was simply one of the many digital things CDs could do. As a storage vessel rather than a music artifact, the CD brought about its own demise. Its mobility and storage capacities took precedence over its materiality. The technology became "little more than a temporary host for music" (Straw, 2009, p. 85). The compact disc was relegated to a "technology of intermediate agglomeration" for the movement of music from older formats to newer storage technologies (Straw, 2009, p. 83). Rather than a musical artifact of its own, the CD's current purpose is to collect media and prepare it for other devices.

The move to cloud computing repeats and extends this process. The digital music commodity first emerged on the computer, but the rise of cloud-based services suggests the computer will not remain the central device for hosting, storing and playing digital files for long. The purpose of CDs shifted as the CD player fanned out into car stereos, portable players and eventually computers. Similarly, the digital music commodity may be taking on new roles as it moves from the computer to the cloud and all its associated devices. Straw (2009) suggests that recording formats can be "distinguished by the ease with which music may be transmitted 'through' them into successor technologies" (p. 84). The digital music commodity is immanently configurable; it is fluid enough to exist on a wide variety of media. It is always in the process of readying music for its future iterations. While it took twenty to thirty years for the CD to lose its artifactual integrity, the digital music commodity has diffused much more rapidly to a far greater range of devices and services. The integrity that the digital music commodity gained through the interfaces of programs like Winamp or iTunes, or in the metadata from the CDDB and ID3 tags, dissipates in the cloud. New interfaces emerge, but they originate from the cloud and propose a further re-imagination of the digital music commodity.

Put technically, "Cloud computing refers to an emerging model of computing where machines in large data centers can be dynamically provisioned, configured, and reconfigured to deliver services in a scalable manner, for needs ranging from scientific research to video sharing to e–mail" (Jaeger, et al., 2009).

Cloud computing services cater to users and businesses with ever-growing amounts of digital data and to an era where the Internet is widely available across multiple portable devices. Cloud-based services promise massive storage space for users' files, playlists, preferences and information as well as remote access to that data regardless of device or location. While we used to rely on our own gadgets for our computing needs, increasingly we shop various pieces of our daily activities out to the cloud (Horrigan, 2008, p. 5). Cloud computing evidences a shift from using our own machines to control our data to trusting the network to store it for us (Hayes, 2008). It is the commercialization of services like data storage, information processing, and computational power (Jaeger, et al., 2009).

Cloud computing is difficult to describe, in large part because it is hard to separate the "cloud" from the everyday conceptions of the Internet as an interconnected network of computers where data resides. The term itself dates back to 1960s computing, where computer visionaries like J.C.R. Licklider and John McCarthy described a vast network of connected computers that allowed access to all sorts of programs and services from all kinds of devices (Mohamed, 2009). Internet critic Nicholas Carr (2009) notes that companies like Western Union (Telegraph) were proposing cloud-like services as early as 1965. Some of the Internet's earliest founders and architects, like Vint Cerf or Bob Taylor, used clouds or other amoeba-like structures to represent the Internet since "they had no fixed topology and typically covered varying geographic areas" (Scanlon & Wieners, 1999). It seemed a fitting diagram to map the architecture of the Internet. In many ways then, cloud computing is a return to previous models of computing where "users accessed information on mainframe computers from terminals that had very little computing power" (Horrigan, 2008, p. 5). It seems new now only because the last three decades have seen a move towards a model of personal computing where processing power and key applications resided on the user's desktop computer (Hayes, 2008; Horrigan, 2008, p. 5). As Larry Ellison, CEO of technology company Oracle, noted sarcastically in a recent interview on the topic: "The interesting thing about cloud computing is that we've redefined cloud computing to include everything that we already do" (qtd. in B. Johnson, 2008). Cloud computing, to Ellison, is a new name for what the Internet has always provided.

If there is something new about the current edition of cloud computing, it is the vigour and resources companies are now devoting to building storage facilities, the technical aspects of cloud infrastructure, and the hardware/software platforms used to access the cloud. On the business-to-business side, companies like Google, Microsoft and Amazon have started renting out storage space and/or computer processing to other businesses with far less powerful IT infrastructure (Horrigan, 2008; Mohamed, 2009). This arrangement allows small and large companies to build applications that generate reams of data or that can perform high level data analysis without necessarily having to invest all the capital such capabilities would require (Horrigan, 2008; Mohamed, 2009). On the consumer side, cloud computing is currently more prevalent and interwoven into our everyday computing practices than it has ever been. A recent PEW Internet Research study suggests that over 69% of all Americans used some kind of cloud computing services, even though many of them were not aware of the term "cloud computing" or what it meant (Horrigan, 2008, p. 7-8). Popular cloud-based email programs (like Yahoo or Gmail) and other cloud-hosted services (like Google Docs, Zoho, and similar online collaborative tools) have crept into our online activities so gradually and seamlessly that most users barely stop to think that much of their data are already in the cloud.

The idea of cloud computing is not just the result of technological progress. Like the push towards multimedia towards the end of last century, the cloud metaphor expresses a particular vision of computing. Clouds, on bright summer days, are big white fluffy concoctions. They are ubiquitous and highly dispersed. They are free to look at and widely available. It is no wonder the metaphor is popular for explaining our relationship with data in the information economy. The cloud is an idealized portrait of what we expect from our information: it should be always there, wherever we are. For the most part, clouds conjure positive images. They reflect "a whiteboard vision of heaven on earth" so the Internet as cloud is a kind of "holy condensation of bits" (Scanlon & Wieners, 1999). However, the cloud metaphor conceals as much as it reveals. Like actual clouds, the data cloud just seems to exist. We take clouds for granted and reflect very little on how they form or what constitutes them. Similarly, the constitution of the data cloud is rarely interrogated. Since the cloud "can be anywhere and everywhere one has access to a computer", it is easy to overlook the server farms, energy warehouses or the geographical, economic, and political conditions that shape the cloud's very existence (Jaeger, et al., 2009). Paul Jaeger and colleagues (2008; 2009), having studied cloud computing infrastructure in the U.S., note that there are over 7,000 data centers in the U.S. alone: "It is no exaggeration to claim that these data centers represent the largest concentration of information and computing resources that the world has ever seen (Jaeger, et al., 2009). As one journalist reporting on data centers notes, "We have an almost inimical incuriosity when it comes to infrastructure. It tends to feature in our thoughts only when it's not working" (Vanderbilt, 2009). Underneath the idea of an ethereal and distributed network of connections and traffic lies the cold hard physicality of warehouses, servers, generators and climate control devices: "In reality, the cloud is giant buildings full of computers and diesel generators. There's not really anything white or fluffy about it" (Data Center Manager qtd. in Vanderbilt, 2009).

The push towards cloud computing is also an attempt to open new revenue streams for a variety of companies and their services. Richard Stallman, open source software guru, notes that the trend smacks of marketing: "Somebody is saying this is inevitable – and whenever you hear somebody saying that, it's very likely to be a set of businesses campaigning to make it true" (qtd. in B. Johnson, 2008). Google's cloud services are a prime example. As users send email through Google's Gmail program, Google serves up advertising that matches the content of the correspondence. Similarly, the use of Google's document hosting service, their chat feature and other services gives Google the potential to track users' habits and practices and to coordinate this information for advertising purposes. The data Google gleans from the cloud is enough to fund the production of more cloud-based services. As Google Chairman and CEO Eric Schmidt notes:

> And so what's interesting is that the two — cloud computing and advertising — go hand-in-hand. There is a new business model that's funding all of the software innovation to allow people to have platform choice, client choice, data architectures that are interesting, solutions that are new – and that's being driven by advertising. (Schmidt & Sullivan, 2006)

Cloud computing is a new business model for the computing industries, then, one that relies on renting storage and processing power as well as on utilizing the cybernetic commodities that the cloud's traffic and activity generates.

Thanks to transectorial innovation and to digital music's increasing resemblance to software, music is now wrapped up in the computer industries' push towards cloud-based service models. As with computing, the idea of music in the cloud is not completely new or without precedent. Cloud-based services share attributes with traditional broadcasting models and commercial radio: the music is stored elsewhere, it is managed by the service provider, it is accessed rather than owned, it is dependent on the device used to access it, etc. Newer cloud-based music services also share much in common with early streaming Internet audio services, like AudioNet and RealAudio in the mid-1990s or mp3.com in the late 90s. Variously called music as a service, music as a utility, or "all you can eat", depending on the fashion, music in the cloud has seemingly been just around the corner for a good part of the last decade ("Cloudy with a Chance", 2010; Kusek & Leonhard, 2005). As with other digital developments, part of the hold up has been the major labels. Historically, the record labels have been leery of cloud-based digital delivery services. They never really warmed to early streaming/cloud pioneers (Alderman, 2001; Rothenberg, 1999) and they are still pursuing legal action against newer initiatives, as in the case of EMI's recent lawsuit against MP3Tunes and their music "locker" feature (Stone, 2010).

The current crop of cloud-based music services are popular, though not pervasive, and the business models behind most of them are still in question (Wilkstrom, 2009, p. 106). There are Internet-based streaming services like Pandora or GrooveShark that build on the broadcasting model established by radio. Users can listen to songs of a certain genre or by a certain artist, though they do not usually have complete control over the exact songs they can hear.[22] Some of these rely on advertising; others allow users to upgrade to a premium ad-free version (Wilkstrom, 2009, p. 106). Companies like Rhapsody, Napster 2.0 or eMusic provide a more formal subscription service where they rent access to their entire collection of music to users for a monthly price. Users "own" and can manage the music as they would with an *a la carte* model like Apple's, though that ownership ceases once they end their membership (Wilkstrom, 2009, p. 102-107). Then there are social network sites like MySpace, Last.Fm and MOG that offer music as a central component of their service. These sites — strange hybrids of commercial broadcasting, social networking, and music magazines — aim to build a community around the discovery of music and access to discussions/information/metadata about music (Wilkstrom, 2009, p. 106).[23]

The cloud-based service that seems most poised for success (as I write) is a Swedish company called Spotify (Van Buskirk, 2009a). It provides on-demand access to over 6 million songs via an interface that combines the best features of Napster and iTunes. The service is free on the Internet (supported with brief audio ads) though if users want to take their catalogue of music with them on their portable device, they need to pay a monthly fee (Van Buskirk, 2009a). The company has reached deals with all the major labels in many European markets and has rapidly become the number one digital music provider in those areas (Van Buskirk, 2009a). Spotify is set to roll out in the United States shortly, though the company has had significantly more difficulty negotiating with the North American branches of the

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[22] This is not the case with GrooveShark, where users can choose the song or the album they wish to stream, though the site's legal status is currently in question.
[23] Last.Fm is currently owned by CBS so its reliance on broadcast strategies is not surprising.

major labels (Van Buskirk, 2009a). Many label executives are still worried about streaming technology and about companies like Spotify that offer musical content for free as a way to attract users to their service.

In conjunction with the proliferation of devices that can playback music, cloud-based services aim to provide users access to their entire library of music regardless of where those users happen to be. Music in the cloud is an attempt to make music available everywhere. As music becomes increasingly pervasive across a wide range of services and devices, new modes of listening emerge. This is what Anahid Kassabian (2001) calls "ubiquitous listening" (p. 16). Music is omnipresent in our lives, both in terms of how much music is being created and available for listening and in terms of the number of devices, places and contexts in which we encounter music. Ubiquitous listening is a mode of listening that is dissociated from the specific attributes of any given piece of music but one that acknowledges that most of our listening happens "alongside or simultaneous with other activities" (Kassabian, 2001, p. 15) Ubiquity stems from two particular developments. First, music is everywhere and all around us. It is so thoroughly interwoven into our everyday activities that it is possible to lose track of the specificity of musical experiences. Listeners may listen to more music then ever, though it is unclear whether they recognize listening as a distinct activity. Kassabian cites the example of one of her students who turned on the radio to begin writing an assignment on a particular program only to find himself washing the dishes several minutes later (p. 12). He forgot the radio was on, or rather, he internalized the radio and started doing chores, an activity he normally undertook alongside the radio. Second, ubiquity is rooted in the "sourcelessness" of the sounds around us:

> Whereas we are accustomed to thinking of most musics (and most cultural products) in terms of authorship and location, this music comes from the plants and the walls and, potentially, our clothes. It comes from everywhere and nowhere. Its projection looks to erase its production as much as possible, posing instead as a quality of the environment. (Kassabian, 2001, p. 16)

Cloud-based music services rely on precisely this kind of logic. The cloud makes music accessible everywhere via the Internet yet it is nowhere on a user's hard drive or computer. The exact details of where the music and its associated metadata are stored are secondary to the context of the overall service.

For Kassabian, ubiquitous listening ultimately leads to a new understanding of subjectivity. Omnipresent music creates a fabric that accompanies the patterns of our everyday actions. Ubiquitous listening is evidence of the "non-linearity of contemporary life"; our lives increasingly involve taking in multiple media simultaneously instead of in sequence (Kassabian, 2001, p. 15). Ubiquitous listening fosters a networked sense of ourselves where we are always connected to our sounded environment: "we turn radios on in empty rooms and put speakers under our pillows. We hang up when a telephone connection is not kept open by sound. We prefer to be connected, need to listen to our connections, can't breathe without them" (Kassabian, 2001, p. 27). Sourceless music insinuates itself into the various facets of our lives. With sound as the background to so many of our activities, the act of listening melts into other practices (Adorno, 1934; DeNora, 2000; Kassabian, 2001). Users may very well use their music players to listen to music, but they also use them to make phone calls, to write essays, to take pictures, and to email, network and connect. Music becomes merely one of many multimedia options. This is not to suggest that music is somehow less relevant or meaningful, as Adorno (1934) may have hoped we would argue. Rather, it is to point out that the specificity of the music experience gives way to a state of being that almost always includes music. Music acts like a "technology of the self", a "resource for the ongoing constitution of [individuals] and their social psychological, physiological and emotional states" (DeNora, 2000, p. 46-47). It helps us express our identities and negotiate our everyday activities. Seen this way, ubiquity may be a sign of music's persistent and enduring relevance as a cultural form. I turn now to explore the specifics of what the move to the cloud means for our relationship with music and the digital music commodity.

Music in the Cloud

One of the most critical differences between cloud computing and the model of personal computing we have become accustomed to over the last two and a half decades is that the software programs and other infrastructural elements for our data no longer reside on our personal machines. They exist out there, in the cloud. This raises obvious comparisons to radio, cable television, movie rentals, or other commodity arrangements that rely on broadcasting, subscription, or rental rather than outright ownership. After all, at first glance, streaming services like Pandora, Spotify or GrooveShark simply seem to offer a more interactive radio experience via the Internet. They are an updated and customizable means of accessing music broadcasts. While the act of listening to music in the cloud is likely similar to previous streaming and rental arrangements, the comparison is incomplete. Cloud-based music services make different requirements of their users and they impose different conditions on the music itself. Radio, for example, does not require you to enter personal data in order to listen to it, as is often required when signing up for services like Pandora or Rhapsody. Radio also remains relatively indifferent to the content and technologies involved. With any number of radio devices, users are free to surf among different services (i.e. channels). Streaming and subscription services, on the other hand, often depend on a particular combination of technologies and they make it difficult or inconvenient to switch to other services. Different services offer different libraries depending on their contracts with the record labels, and it is difficult to combine music from different services or export data from one service to another. Since their very customizability and interactivity depend on the collection of personal data, could-based services embed users into their service more thoroughly than traditional radio. Users are of course free to switch to other services, but there is a cost to doing so; libraries, playlists and preferences will all have to be re-built with the new service. Even low participation services like MySpace or other basic streaming services still limit the amount of interaction with the service or control over organization and playback that users can have without signing up for an account. While cloud-based services may feel familiar to radio, movie rentals and the like, they nevertheless represent a significant shift away from the dominant mode of music consumption for the better part of the last century.

Cloud services allow for some legitimately novel and improved musical experiences, but the cloud metaphor obscures many of the drawbacks embedded in this shift. Streaming, subscription, and other cloud-based services enter their users into service agreements that basically rent music out for a certain fee or dole it out under certain conditions. Music in the cloud allows other entities remote control over a user's library and makes music contingent on the service in question and a complement used to prop up other commodities. As music moves from the status of a good that we maintain and curate on our personal computers to a service we turn on and off via multiple devices, we find ourselves more and more removed from the music itself. While music has always relied on the technologies of its production, distribution and consumption, music in the cloud is a highly technologized vision of music that requires numerous pre-conditions for the playback of music. It is a specific snapshot of music as a cultural commodity, one that views music as indelibly networked to particular providers and technologies.

McCourt and Burkart's (2006) work on the celestial jukebox is one of the most rigourous academic attempts to shed some light on the nebulousness of the cloud. Although their research discusses digital music in all its form (i.e. downloads, subscriptions, streaming, etc.), their analysis is primarily concerned with the move away from music as a good that individuals own to music as a service various companies in the music industries provide. In their view, the celestial jukebox represents the organized technocratic control over digital music through customer relations management technology that acts like "sophisticated spyware" and digital rights management technology that "personalises network power" by creating trusted systems that enforce particular behaviours (Burkart & McCourt, 2006, p. 357). Ostensibly positioned as an additional storage option or an off-site personal library, the cloud shifts control of the music commodity out of the hands of users and becomes an efficient tool for data collection. McCourt and Burkart worry that the celestial jukebox puts "new and enduring constraints on music's viability as a cultural practice protected from pure market functionality" (p. 359). For Burkart, music in the cloud is a threat to music's very status as a socio-cultural good.

Burkart (2008) has a litany of criticisms for the way the celestial jukebox is evolving:

> In the audio-visual enclosures created by intellectual property law, contract law, and computer software, music collectors face a loss of property, control and usability, legal rights of first sale, consumer product protections, and other customary rights and privileges. It remains largely unclear who and what are in charge of the manner in which music reaches the music fan who has signed up for cultural services. (p. 250)

Chief among Burkart's oppositions is that music in the cloud is entirely dependent on the unregulated whims of record labels and technology companies. These music service providers are seeking to maximize value for the digital music commodity and, in the process, they ignore how users want to receive and use music in their lives. Open source software guru Richard Stallman shares similar concerns about the loss of control the cloud enforces on users: "One reason you should not use web applications to do your computing is that you lose control. […] You're putty in the hands of whoever developed that software" (qtd. in B. Johnson, 2008). While it may seem convenient to keep all our music, email and other documents on someone else's (much larger) server, data in the cloud becomes at least partly property of the companies that manage the service.

Music as a service provided via the cloud becomes what Zittrain (2008) calls "contingent". Contingency arises from devices, programs and goods that are "rented rather than owned […] they are subject to instantaneous revisions" (Zittrain, 2008, p. 107). Zittrain argues that tethered appliances lock consumers into certain services and patterns of consumption and, in doing so, exert an effect on the goods that pass through those devices (p. 107). He uses the example of a toaster that has two slots, or a record with a set amount of songs on it. If the company that manufactures the toaster wants to add a third slot or the artist behind the record wants to include a revised version of a particular song, users have to return the goods in question for service/updating or they have to purchase the new version outright. In the realm of goods as services, the upgrades are on-going: "A continuing connection to a producer paves the way for easier postacquisition improvements […] more features, instantly distributed" (Zittrain, 2008, p. 107). While this sounds like progress — and with certain products, it may ultimately be cheaper and more convenient — this kind of contingency shifts control over devices and their capabilities even further away from the consumer. The features that drew users to buy a device or subscribe to a service may or may not continue to be provided in each upgrade. As a result: "more and more of our experiences in the information space will be contingent. A service or product we use at one moment could act completely differently the next, since it can be so quickly reprogrammed without our assent" (Zittrain, 2008, p. 176).

The cases of the MSN and Yahoo stores described in the last chapter are clear examples of the negative consequences of contingency (Burkart, 2008; Sorrel, 2008; Van Buskirk, 2008c). Amazon's recent "recall" of a few titles by George Orwell on its Kindle e-book reader is an even more extreme case. After operating its e-book store for several months, Amazon discovered that it did not have all the rights necessary to sell electronic versions of books like *1984* and *Animal Farm* (Stone, 2009). Their remedy was to remotely erase copies that users had already purchased through their Kindles (Stone, 2009). Consumers were understandably annoyed: "I never imagined that Amazon actually had the right, the authority or even the ability to delete something that I had already purchased" (Kindle user qtd. in

Stone, 2009). Even for those who had bothered to read Amazon's terms of service agreement, it was never clear that Amazon could enforce such control over its sales or that its e-books could be that contingent (Stone, 2009). One student who had been using his Kindle to make notes and annotations on his digital copy of *1984* lost not only the product but also the product of his labour (Stone, 2009). Although Amazon acknowledged the move was likely the wrong one, their behaviour underscores the transience and instability of digital products that are governed by remote connections to the cloud. When companies treat cultural commodities as software, they gain greater and more sustained control over those goods and the devices used for their playback. Just as clouds are subject to the whims of the wind, data in the cloud are often far beyond the control of the users who have invested time, effort and money into creating and maintaining it.

It is not just content that is contingent. The devices for music playback are contingent as well. Many companies that manufacture digital music devices deliver regular software and firmware updates in ways that can significantly hamper a user's experience of the product. Apple's iPod Touch and iPhone, for example, are updated every few months with revisions to the operating system. Although some users are content to use the devices as is, there is a relatively active community of users who have hacked the gadgets to extend their phones' capabilities (i.e. jailbreaking). When Apple caught on to this user practice, they started using the software updates for a dual purpose. Apple's updates not only provided bug fixes and regular maintenance, but they also included code and instructions to "brick" hacked devices: to return the phones and music players to an un-hacked state and, in many cases, render them completely inoperable ("Apple iPone Warning", 2007). The device was contingent on remotely controlled software updates that functioned as a means for Apple to prescribe specific uses and to restrict others. Users who store their music in the cloud are also dependent on having regular access to the Internet, cell phones and other data streams. While CD players and tapes only required one other device for playback (i.e. a CD player or tape player), music in the cloud is contingent on a network of technologies, devices and connections.

The cloud service itself is also contingent. Personal music collections are subject to the successes and failures of the company that is charged with storing them. Spotify, for example, ran into some early troubles with its service when a large number of user accounts were hacked and their personal details made available: "Along with passwords, registration information such as your email address, birth date, gender, postal code and billing receipt details were potentially exposed" (B. Johnson, 2009). Signing up for many cloud-based services requires users to provide this kind of data. As a result, music in the cloud exposes users and their libraries to different kinds of risk than those associated with previous media. With CDs or tapes, users worried about lost, stolen or damaged commodities. With music in the cloud, users have to be concerned with the network of information they make available that might potentially be vulnerable to exploit. Burkart (2010) notes that with "a standard CD collection and a standard CD player, the music fan's experience of playing music is mediated only by the CD and the CD player. There are no extra steps requiring authentication or any other transactions requiring a user interface" (p. 129). This kind of mediation had a relative amount of user freedom built in since it relied on "dumb" interfaces: interfaces that did not need to know what music was passing through them, who owned it, or any added details about the user in order to play music (Burkart, 2010, p. 129). Many cloud-based services, on the other hand, use personal data as a way to authenticate the connection between the various interfaces and devices:

> Digital music files put music fans utterly at the mercy of wonkish computer software and vendors. If the client software fails to initialize properly, it will be impossible for the computer or the portable device to find the music file names necessary to generate the queue or the playlist. Software GUIs (graphical user interfaces) restrict user controls over music files in ways that cannot be compare to the more direct and hands-on access to music through a CD player, cassette player, or record player." (Burkart, 2010, p. 129)

Although Burkart misses some of the ways interfaces and devices actually open up a user's relationship with music (as I suggest in chapters 1 and 3), his overall point is well put. Music as software requires other software and technologies to decode or encode specific files and file formats. It complicates the process of playing music by incorporating more data and technology into the process. Given the rapid rate of obsolescence for digital formats and technologies, these relationships are even more vulnerable than they have been with previous formats and playback technologies.

Music's contingency in the cloud ultimately impinges on the rights of musicians and users. Music as a service creates pressures to "'clientelize' and juridify private and cultural life, while technocratic controls substitute for interpersonal and negotiated transactions in acquiring music […] Clients of music services must accept rights that are increasingly juridically restricted" (Burkart, 2010, p. 39). Legislators and policy-makers have had a difficult time keeping up with the flurry of new digital services that have emerged, so many digital distributors and retailers set their own rules for their technology outside the purview of the kind of government regulation, monitoring and oversight that governed previous forms of the music commodity. As a result, the terms and conditions that guide a user's rights with the digital music commodity are completely "unilateralist" (Burkart, 2010, p. 73). The license for the iTunes Store, for example, gives Apple the right to change the terms of use of their downloads without any previous notice or warning " (Burkart, 2010, p. 73). As was the case with Amazon — where the terms of service said little about the company's ability to erase copies of books already purchased by consumers — companies that deal in digital goods view users rights as always subject to change.

Cloud-based services allow for an even greater affront to users' rights. In a recently released highly critical report on cloud computing, the Office of the Privacy Commissioner of Canada ("Reaching for the Cloud(S)", 2010) notes that cloud services offer a worrying lack of consumer control over data and services, lack of meaningful consent to advertising, and often lock consumers in to specific services by centralizing user data and not making it readily exportable. Data in the cloud also opens up user information to misuse, obsolescence, and invasion, often without the knowledge of the user ("Reaching for the Cloud(S)", 2010). Whereas the loss of physical artifacts like CDs or tapes could be considered damaging and an invasion of privacy, their exploitation makes nowhere near the amount of data available as some of the current cloud-based music services. Additionally, because of the cloud's imprecise location, it remains unclear which states, governments, private actors or other political bodies have jurisdiction over the cloud and the data streams it generates (Jaeger, et al., 2008, p. 277; Jaeger, et al., 2009).

In addition to user rights, those of musicians are also in peril. The example of Billy Bragg and MySpace is telling. MySpace — purchased by News Corp. for $580 million in July 2005 (Butcher, 2006) — was an early social network that let users download songs for free or stream them (Stone, 2005a, 2005b). Although it was not entirely a cloud-based music service for users, it was for musicians. Artists could offload the duties of designing a website and hosting music files to MySpace. In 2006 Billy Bragg, a singer/songwriter known for his left wing politics, withdrew his music from the site, citing that MySpace's user agreement put troubling conditions on the rights to copy, reproduce and publicly perform the material found on the site. Specifically, Bragg was directing his complaint at this particular clause of the "Terms of Use" document:

> By displaying or publishing ("posting") any Content, messages, text, files, images, photos, video, sounds, profiles, works of authorship, or any other materials (collectively, "Content") […], you hereby grant to MySpace.com, a non-exclusive, fully-paid and royalty-free, worldwide license (with the right to sublicense through unlimited levels of sublicenses) to use, copy, modify, adapt, translate, publicly perform, publicly display, store, reproduce, transmit, and distribute such Content on and through the Services. (MySpace.com, 2006)

After Bragg's high profile interjection, MySpace quickly rewrote the terms of use. The new wording clarified that musicians maintained ownership over their rights and that they were simply granting MySpace a limited license for use of the material on the site. Still, Bragg continued to push MySpace and sites like it, since they frequently encroached on the rights of musicians (often without explicitly asking them) by treating music as a mere tool with which to attract traffic to their projects (see for e.g. Bragg, 2008).

Part of the reason the rights of musicians and users have been relegated to the background is because music itself is secondary on these sites. Ubiquitous music increasingly takes on the role of what management and business professionals call a "complement": a good that increases the value of another service that is outside a company's core offering (Carr, 2007). MySpace and other such sites overlook the rights of musicians or users because their decisions are made based on wholly other problems. The intricacies of the music commodity are secondary, if only because music itself is just one part of an overall offering that includes social networking or other end goals. Apple's success in the digital retail market also relies on treating music as a complement. Music was not part of Apple's core business, computer software and hardware were. Apple focused instead on providing the devices for which music was essential. Carr (2007) notes that an increase in the supply or a decrease in the price of complements results in a greater demand for the product in question. This is precisely what Apple realized with the case of music. Since Apple was not concerned with profiting from music directly, it could afford to sell songs at a price well below its competitors. Beyond that, music was an abundant resource on file-sharing networks. As a cheaply priced and widely accessible commodity, music could act as a powerful complement to Apple's iPods and other devices. Cloud-based music services further enhance music's status as a complement. As such, music is subject, Bragg discovered, to the needs of the systems within which music resides. If music is not the focus of a site or a service, it ceases to drive the conditions, interfaces and features of the service. It acts instead as a marketing tool. Music is just another piece of data; employed to draw traffic, increase social networking, or add value to the newest gadget.

The move to music in the cloud also extends the scope and scale of labour that is expected from the digital music commodity's users. As with the CDDB and iTunes, fan labour provides a key source of value for cloud-based services, whether that's in providing the content for the various sites, feedback on the music through ratings and play counts, or as discussion moderators or online reviewers (Burkart, 2010, p. 80-81). More than just a question of free labour, Burkart argues that this activity displaces some of the previous kinds of community, fandom and scene building activities that make music such a powerful cultural resource. Last.Fm's scrobbling software that tracks how many times a user plays a song, MySpace's play count, or the myriad of technologies that allow users to recommend their favourite acts, promote their music, and add them as "friends" are all examples of how companies are capturing consumer behaviour and putting it to work in service of selling digital music. To be fair, fans were performing some, if not all of these activities, long before digital music. The difference with cloud music is the extent to which this labour can be tracked, exploited and put to use for purposes other than leisure and the degree to which it is embedded into the very business model of the service itself. In many ways, users cannot participate in cloud music *without* working.

Beyond the question of user rights and labour, the cloud raises some aesthetic issues for the music experience. Collecting music within the confines of an online music service provider puts the status of the collection in question (Burkart, 2010, p. 128). Instead of owning music outright, users "lease access time to catalogues of recorded music and retain no access right when their access time ends" (Burkart, 2010, p. 74). While this model of ownership shares similarities with out-sourced storage lockers, vaults and safety deposit boxes or with movie rental business models, it is far more nebulous than these familiar forms. Keeping music collections in the cloud means never really knowing where those files reside, and never fully controlling their management and organization. With music as a digital file stored locally on personal computers, music collectors had access to, and reasonable control over, the files themselves, the folder structures that governed their organization and the interfaces through which collecting and playback occurred. They could change the metadata to suit their needs, order the collection and customize its appearance to suit their needs. The move to the cloud surrenders these capacities to music service providers.

This has curatorial implications. Whereas traditional music collections can be thought of as (carefully/lazily) curated exhibits of the self, cloud-based services perform all the tasks of gathering, sorting and presenting music for the user. Part of the appeal of a music collection, or any collection, are the traces the collector leaves behind as they make decisions — what to keep, what to get rid of, what to show, what to hide, how much to keep, where to keep them, etc. — about the nature of their library. This applies equally to fanatic collectors and everyday consumers. As cultural commodities circulate through a person's collection, either from the effort of direct acquisition and maintenance or from the entropy of sheer accumulation, they reveal something about the person doing the collecting. Even in the case of digital files downloaded from file sharing, there are still decisions to be made about the nature of the library, even if the scale and scope of collecting practices have substantially increased. Users still need to invest time and effort into their collections, be it searching for files, downloading them, tagging them, organizing them within folders, etc. and this provides much of the source for the cultural ownership they feel over their libraries. In the cloud, many of these activities disappear, or are provided for users by the service. In the cloud, music collections are instant and pre-selected. They are not compiled and tended to over time. Instead, users are either part of a service or not. Digital collections in the cloud are digital in the purest sense. They are a one or a zero, an on/off switch rather than an individually selected expression of one's own personal relationship with music.

This leveling of the collection has its benefits. Cloud-based services promise all their users access to the same sizeable collection of music for a fraction of the price it would cost to acquire those commodities individually. This makes it increasingly easy for younger or newer users to familiarize themselves rapidly and comprehensively with a particular artist or genre. It is also likely that no two users will navigate the cloud in same way, since the incorporation of playlists and other customization features will allow users to carve out their own kind of "collection" in the cloud. But the added benefit of being able to access all the same songs suggests that context has usurped content. In the cloud, with everyone sharing access to the same music, how information gets presented and made available is more important than the character of the information itself (Wilkstrom, 2009, p. 175). Different cloud-based services will stand out based on the kind of information about the music commodity they enable, and the ways in which they integrate that information into the overall music experience. Questions about "how and where is this music used/needed" (Bodker, 2004, p. 18) become as central as questions about what music to listen to. However, each context will bring with it its own interface, its own formats, and its own rules and terms for accessing the music. Many cloud-based services currently prevent users from moving all their music from one service to another. Each service provides its own kind of digital lifestyle management by locking user data to the specific provider.

Bodker (2004) wonders what will happen when music collections contain a plurality of music formats (Vinyl, CDs mp3s etc.). He suggests some users will create hierarchies of materiality, keeping the most valuable music on physical formats (i.e. vinyl or CD) and more ephemeral, spur of the moment songs in more liquid formats, like mp3s (Bodker, 2004, p. 15). For Bodker, different formats hold unique status within a user's collection: "each individual user will arguably increasingly accumulate musical artefacts under somewhat changed circumstances, which entails a choice of materialities and content" (p. 12). The transition to the cloud will not be immediate, or complete: "For quite some time, more and more users will thus face a choice of reproduction and storage media, a media matrix, with different possibilities and cultural connotations" (Bodker, 2004, p. 14). Music's older commodity forms will not simply disappear into the clouds; they will co-exist, intermingle and influence each other. Collections will be a mix of different micromaterials, each with their own prescriptions. The cloud will be one collection among several we maintain.

Ultimately, for Burkart (2010), the trade-offs for the music collector are far too great. The conditions set out by cloud-based services and the celestial jukebox are "incommensurable" with previous ways of collecting, using, and experiencing music: "Given their obsession with control over making choices about playing music, why would music collectors choose to become subscribers to a music service that extinguishes so many aspects of users' control over music collections?" (Burkart, 2010, p. 134). Why would lovers of music put up with a completely contingent relationship with music? For Burkart, this is clearly rhetorical. But it is actually the crux of the current crisis with the place of music in social life. The more entrenched music as software becomes, the more natural it becomes to view music as a service. The more ubiquitous music appears, the more difficult it is to conceive of music as a separate and distinct experience from our everyday activities.

CONCLUSION

THE PROMISE OF DIGITAL MUSIC

In a blog post entitled "We Will Only Propagate Exceptional Objects", Kevin Barnes, the eccentric front man for the indie rock band Of Montreal lays out the details for the launch of the group's 2008 album *Skeletal Lamping*:

> The concept behind the Skeletal Lamping Collection is this: ideally, every object that you bring into your home, should feel exceptional to you. Otherwise, it just adds to the clutter and chaos of your life. We feel that there's no reason to produce another object that just sits on a shelf. We only want to produce objects that have a function and that can be treasured for their singularness. Objects that can transform a room, bend the mind and inform your dreams. A CD has little value, as an object, and the conventional, right angle plagued CD packaging, we've been forced to endure forever, has nothing new to offer us either. That is why, instead of following the tired path of the past, we've decided, to release a table top floral beast, a lantern, a collection of wall decals, a stallion shaped print, a collection of pins, and a clothing and tote bag line as our album packaging instead. (Barnes, 2008)

For those familiar with the band, the release strategy mirrors the unconventional song structures and narratives found on recent Of Montreal albums (Barnes is known for inhabiting the role of a middle aged, libidinous, black she-male — a kind of cross between Ziggy Stardust and Prince — both in concert and on his albums). More importantly for the current discussion, the example of *Skeletal Lamping* provides an insightful bookend to the arguments made throughout this dissertation. The launch of the album is an experiment with music's commodity form. It is rooted in an appreciation of the role the commodity plays in the overall music experience and in a desire to use new technologies to reconsider our relationship with musical as a cultural commodity. Of Montreal wanted their music to be both useful (i.e. use-value) and singular (i.e. exchange value). The CD commodity, at least for Barnes, had ceased being either. It no longer provided the appropriate aesthetic or functional experience for storing and playing music. To overcome these limitations, the band embedded their music into a variety of other objects. The paper lantern, the wall/table stickers, and the other goods all came with a code and a link to a digital download of the album. They were not music commodities, per se, but they were not regular tote bags or pins either. They were exceptional objects, hybrids of digital music and re-purposed commodities.

Skeletal Lamping is a concrete example of the premise that has guided this entire project: our experience and appreciation of music is highly dependent on and mediated by music's commodity form. The beauty of music is indelibly linked to, and sometimes at odds with, the technologies and materials that carry and present it. The launch of *Skeletal Lamping* also documents the distance the music commodity has traveled since it began its migration to a digital format. Initially, on computers, the music commodity was decontextualized and stripped of many of the materials that previously contributed to its use and exchange value. A result of transectorial innovations across the music and computing industries in the 1980s and 90s, music's move to the computer was characterized by a series of false starts and halfway technologies that sought to acclimatize users to the playback music on computers. As part of a wider push towards multimedia machines, music as a digital file was not just a technical challenge; it was a cultural process. The rise of digital music was entwined with a vision of computing as an act of personal expression and self-actualization.

In its new environment on computers, the Internet, and on various portable devices, digital music underwent an interface-lift. Thanks to metadata and the interfaces of new software and hardware, music's paratexts were re-imagined and reconstructed. Programs like Winamp were among the first attempts to make music technically and culturally understandable on computers. Through skeuomorphs and other design cues, they presented digital music as a combination of the future and the past. Along with technologies like the CDDB and ID3 tags, music's new interfaces and micromaterials helped transition users to new musical practices by making digital music feel familiar enough to be comfortable yet novel enough to be exciting. Winamp and the metadata technologies that evolved along with it were central for users looking to organize, sort handle and play digital music. They described music to their users and, in doing so, prescribed some of the ways in which users could interact with their libraries.

This moment of flux provided a chance to reconsider the codes and conventions of the music commodity. The move to computers was part of a zero moment that called the status of the music commodity in question while simultaneously reinforcing its influence. As much as technologies like Winamp, the CDDB or Napster represented a challenge to the value and worth of the music commodity, or even an outright refusal to acknowledge music as a commodity, they were also central in developing features that would eventually make digital music a sellable thing. By creating the interfaces and metadata of digital music, these technologies made the experience of music on the computers consistent but also distinct from previous forms of the music commodity. The micromaterials programs like Winamp, the CDDB or Napster introduced new sources of commodity fetish for music as a digital file. By gathering an audience and providing ways to trace the valuable networked patterns and practices that audience generated, they connected a disparate group of users all interested in a range of musical and digital goods. Despite the cries of revolution that accompanied the early days of digital music, technologies like Winamp, Napster and the CDDB were also starting points for the digital music commodity. They underscored that music never really existed in some pure digital economy on the Internet. Even if music online was "free" through file sharing services, it was still made to behave like a commodity. The Internet may have opened up possibilities for music as a gift, or for alternative forms of exchange, but it did not strip music of all the features that contributed to its commodity character.

Music's move to a new format also offered an opportunity for companies involved in the production and distribution of music to extend and amplify their control over music as a cultural commodity. The micromaterials of digital music allowed record labels and technology companies to embed digital rights management, proprietary file formats and other types of control into the very core of the commodity. Far from a disruptive technology, record labels and other actors saw the digital music commodity as a moment of technological change through which they could secure economic and cultural advantages through code, law, and regulation. Digital rights management technology played a particularly influential role in the rise of the digital music commodity, locking users into digital enclosures made up of networks of interdependent technologies. Even though retail outlets like the iTunes Music Store have stopped wrapping their music in DRM, the legacy of the technology lives on in a broader and subtler kind of digital lifestyle management. With iTunes, Apple integrated the act of buying music with the acts of playing and organizing it, and made each listen a potential sales opportunity. The store is highly integrated and networked with other technologies and through it, Apple influences the shape of the digital music commodity and the conditions of musical experience more broadly.

Skeletal Lamping also hints at the complicated status of labour with digital music. Entwined as it is with computers and other objects, the digital music commodity includes not only the work of creating music, but also the effort of building and designing the hardware, software and peripheral objects that package digital music. The production costs for the *Skeletal Lamping* music commodity are a fraction of what they would have been had the band produced CDs. However, there are still the album's various iterations to consider (i.e. the wall print, the tote bag, the pins, etc.). The peripheral objects that house the digital music commodity are not nearly as infinitely reproducible as the songs they hold. Hardly immaterial, music's micromaterials are still intimately tied to the effort and work of design, coding, and production. While much of this labour stems from the tireless work of young, energetic computer coders from Silicon Valley or, in the case of much computing hardware, the cheap labour of out-sourced factory workers outside North America, the work of production and manufacturing is only half of the equation.

As the cases here have shown, many of the most important features of the digital music commodity have come from the work of users and hobbyists. These "labourers" have contributed on an on-going basis towards the development of new musical experiences. They have helped design interfaces and faceplates for Winamp. They have created and maintained crucial metadata databases like the CDDB and designed file structures like ID3 tags for embedding contextually relevant information about the music into digital files. The labour of circulation cultures like Napster's commodity community presented the viability of a more widespread digital music retail market and proved how valuable cybernetic commodities could be for companies involved in data mining and surveillance. Even at the iTunes Music Store, a host of user-generated work (from iMixes to user ratings of songs and albums) is routinely incorporated into the overall digital music experience. In some cases, like iTunes' iMixes, this labour is freely given; in others, like with Napster's commodity community, it is freely taken by actors looking to exploit the data that labour provides. The digital music commodity is a cybernetic commodity. It creates multiple registers of value and profit (i.e. selling digital music, selling the data digital music generates, selling the devices for digital music, etc.) that make different demands on users. The digital music commodity does not just implicate users in its production, reproduction and circulation; it is entirely dependent on user labour for its value, shape and existence. The digital music commodity is inherently partly a user-generated commodity.

Skeletal Lamping reveals the contradictory aspects of the digital music commodity. On the one hand, the album's launch details acknowledge that the music commodity is an increasingly mobile and shape-shifting one. The decoupling of musical content and certain aspects of its physical packaging has opened up a variety of possibilities for its repackaging and rehabilitation. Music in its digital form can arrive on computers or mobile phones, but it can equally appear, as Of Montreal show, on a giant floral print in the shape of a horse. Music as code is fluid and configurable. It is less bound to any one particular material expression. It gets reassembled through interfaces like Winamp or iTunes. On the other hand, *Skeletal Lamping* is keenly attuned to music's materialities and to the object-ness of the music commodity, be it analog or digital. It admits that digital music becomes physical in a variety of ways, through a number of interfaces, technologies and packages, and that these manifestations matter. As much as programs like Winamp, iTunes, and Napster were software or chunks of immaterial code, they were also crucial in concretizing music's commodity form. Take, for example, Winamp's visualizer or the way Napster's interface made the idea of the network visible. These were visions of how the digital music commodity could and should appear. Like Of Montreal, they recognized that the packaging and interfaces that wrap and carry music deserve to be as exceptional as the music itself.

As much as Of Montreal's blog post was a press release about their upcoming album, it was also part manifesto. Echoing New Communalist visions of individual and social transformation, Barnes wanted to use the moment of technological change to open up possibilities for a wide range of music commodity experiments. He wanted to propagate exceptional objects:

> of Montreal has, from the beginning, taken great pains to always put a lot of thought and care into the art packaging for our records. We've always felt that the packaging was just as important as the music inside of it. We've worked within the constraints of conventional album packaging, and have tried to create something fantastically uncommon every time. Now, we find ourselves in the middle of an exciting epoch: A time, when new technology has shattered the conventional business model and has set a paradigm shift in motion. For some people in the music biz, this is terrifying. For us, it is a fucking miracle! While the kings are in a stupor, we are going to take full advantage of the changing guard. (Barnes, 2008)

Underneath the rhetoric of kings and miracles, Barnes is actually pointing to what is exciting about the transition to a digital music commodity. It is a moment that puts on display the codes and conventions that have governed the circulation of music and allows them to be interrogated. Even if such zero moments are not necessarily blank slates, they open up fissures and cracks through which new relationships with music and its technologies are visible.

Barnes' optimism is mirrored in the many musicians, labels and producers, who hold out hope that digital music might reorganize the traditional balance of power in the music industries. The Future of Music coalition (FMC) — an organization that serves as a voice for musicians in matters of U.S. technology and cultural policy decisions — sums up this possibility in their manifesto:

> Recent advances in digital music technology are loosening the stranglehold of major label, major media, and chain-store monopolies. Digital download and online streaming technology offers musicians a chance to distribute their music with minimal manufacturing and distribution costs, with immediate access to an international audience. (FMC, 2000)

For the FMC digital music offers two primary opportunities: 1) economic advantages and 2) the possibilities for structural change. The economics of digital music production create significant cost-savings (Byrne, 2007). Traditionally, artists see anywhere from 10-14% of sale of a $16 or $17 CD with the rest going to label and retail overhead, marketing and other costs (Byrne, 2007; Krasilovsky & Shemel, 2000; Thomson & Zisk, 2003).[24] Digitization eliminates a number of these costs entirely, and greatly reduces some of the others. There are still studio fees, marketing and advertising campaigns, time and effort for discovering new talent, and administration fees, but "manufacturing and distribution costs for digital goods are approaching zero" (Byrne, 2007). New costs may emerge (i.e. bandwidth costs, fees to manage the software and hardware infrastructure, etc.) but these pale in

[24] This number can vary greatly depending on the particulars of the artist's contract, and on the kinds of upfront costs the label adds into their deal (Thomson & Zisk, 2003)

comparison to the costs for reproducing, shipping and retailing a physical product. High profile musicians like David Byrne (formerly of art-rock group The Talking Heads), along with organizations like the FMC and the Electronic Frontier Foundation suggest the savings from digitization should be passed on to consumers in the form of cheaper access to music and to artists in the form of better royalties (the FMC suggests artists could stand to make upwards of 40% of the sale of a digital download in Thomson & Zisk, 2003).

Aside from economic benefits, the larger hope for digital music lies in the structural changes it portends. Artists increasingly have access to a wide variety of tools that allow them to produce, distribute and market their own music and circumvent the traditional paths of circulation for the music product. Digital technologies, in theory, also put artists directly (or at least more directly) in contact with their fans. As the FMC notes:

> Disintermediation — the fracturing of the system of bottlenecks and gatekeepers that controlled some of the major means of production, distribution and access to audiences — has led to incredible opportunities for our field. […] Songs that would never be programmed through currently-existing narrow commercial channels are slipping through the radio industry programming stranglehold and gaining exposure, thanks to the new breed of file-sharing programs. (FMC, 2000, 2010)

Cutting out the intermediaries makes it cheaper to produce and market music and it potentially affords artists more intimate and meaningful relationships with their fans.

Unfortunately, these particular promises have yet to materialize. Most online stores continue to yield a similarly small percent of return for artists despite the savings brought by digitization. Instead of better compensation for artists, Byrne notes that it is entirely possible that musicians could make less money through iTunes than through traditional retail channels (Byrne, 2007). The FMC, while praising the iTunes store's interface and unique pricing structure, noted that the process for independent musicians accessing the site was not ideal and the revenue split left much to be desired (Thomson & Zisk, 2003). Joseph Bailey and Yannis Bakos (1997, p. 10), in a study of digitization across a range of industries, confirm that the shift to online and digital commodities and business models rarely results in significantly lower prices for consumers. Instead of fewer intermediaries between artists and consumers, there are simply different ones (and in some cases, more of them). Artists often need labels to take care of their physical goods, and different companies to manage their digital goods and rights. Stores like iTunes that offered the promise of "frictionless" capitalism have evolved into digital replicas of off-line retailers. More and more artists are struggling for less and less digital shelf space, yet the economics underlying each individual sale have hardly changed at all.

This is not to suggest that the digital music commodity is without promise. The migration of music on CDs to music as a digital file has opened up a wealth of opportunities for artists looking to communicate their art. *Skeletal Lamping* is just one of a series of recent experiments with the form and circulation the digital music commodity. Radiohead's launch of *In Rainbows* is another. Rather than sell the album through traditional channels, the band put *In Rainbows* up for download on its website and asked users to pick their own price, which could even include $0.00 (Byrne & Yorke, 2007; Ryzic, 2007). Other artists like Brooklyn-based mashup artist Girl Talk or U.K. rockers The Charlatans have followed suit, offering a similar deal for users (Gibson, 2007; Pandey, 2008). Nine Inch Nails' Trent Reznor went even further with his album *Year Zero*. He seeded the album on file sharing services and encouraged users to download it for free (Rose, 2007). However, he also designed a live action video game with album-related clues that drove users to his concerts, his website and his music. Ambient pop singer Imogen Heap decided to offer up early studio mixes of all her material on the latest album and kept in correspondence with users via video blogs and social networking sites to obtain their feedback on the music and the packaging that went along with the commodity (Fusilli, 2009). Users even generated the liner notes, 140 characters at a time, through the micro-blogging service Twitter (Bascaramurty, 2009).

Arguably, the success of these initiatives is largely because of the pre-existing popularity of the acts in question — popularity that comes from years of marketing and promotion provided by the industrial system that some of these artists are now trying to circumvent. Outside of these high profile experiments though, there are countless independent and emerging artists all trying different models of making and circulating the digital music commodity. There are bands asking users to pay what they want on sites like Bandcamp or GarageBand. There are artists giving away digital songs with the purchase of an accompanying physical artifact. Websites like Sell-A-Band encourage users to invest in bands, like stocks, and the funding helps seed the production of new music. Other music retail sites, like Amie Street, are toying with variable pricing based on the popularity of songs on the site: as a song gets more popular, its price increases, adding a kind of monetary value to the process of discovery. Before it was shut down, Swedish file-sharing site The Pirate Bay was developing a business model that saw users pay a certain price for access to music. Interestingly, this fee varied depending on how much computer storage space and resources the user contributed to the Pirate Bay's commercially available cloud service (Urquhart, 2009). In essence, the Pirate Bay wanted to use peer-to-peer technology to trade one service, storage and resources, for another, music and video (Urquhart, 2009). These kinds of innovations are rife at all registers of the music industries. As one journalist noted, business models are the new punk (Van Buskirk, 2007b).

Of course, not all of these models will be successful. In fact, some of them have already failed due to poor economic performance or lack of users. Nor am I suggesting that every artist should follow the lead set in the examples above. Rather, these initiatives demonstrate the flexibility and multiplicity of the digital music commodity. Regardless of what it holds for the economics of music or the structure of the music industries, the promise of digital music lies in its re-combinatory possibilities. The digital music commodity opens music up to multiple modes of presentation. Songs can come out in batches of twos or threes, they can be priced at 10 cents or 10 dollars. They can have a variable price, or no price at all. There are no rules about length. There are few standards of organization and presentation. The digital music commodity can be sold in a store or directly by artists. It can be a service or a good or a gift. iTunes, Spotify, and many other digital retailers tame these possibilities in the name of user-friendliness. The music industries are anxious to solve the digital dilemma and are looking for what Patrik Wilkstrom informally calls "The New Business Model that will Save Us All" (Wilkstrom, 2010). They are hoping for technology, like iTunes or Spotify, that can galvanize enough users to define the model for making and marketing music for the next several years. But in their attempts to achieve a consistent and convenient process, these digital retailers standardize and rob the digital music commodity of much of its force. The promise of digital music does not reside in one particular way of selling or distributing. In fact, the search for a standardized business model runs counter to the very promise of digital music.

Importantly, the examples above do not make music any less of a commodity. Even though they make music available for free or charge users with the task of assigning a price, the essence of the music commodity does not disappear. Price is only one part of a commodity and it is often, as the cases here have revealed, its least interesting attribute. What these examples share, however, is a desire to make users and listeners question what kind of a commodity music is and what value it holds for them. The above experiments with the codes and conventions of music's commodity form encourage both artists and users to re-evaluate what the music commodity is worth when it inhabits a digital form. As one of Radiohead's managers notes about *In Rainbows*: "The industry reacted like the end was nigh. '[Radiohead have] devalued music, giving it away for nothing.' Which wasn't true: We asked people to value it, which is very different semantics to me" (qtd. in Byrne & Yorke, 2007). Free music does not mean music without value, nor does it mean music that is not a commodity. In this case, free or the possibility of free forces a kind of questioning of the relationships between users and the objects that circulate around them.

If commodities have social lives, users are and have always been part the commodification process. The digital music commodity makes this abundantly clear. In doing so, it highlights a truism of all commodities: value is always subjective. Rob Walker, a critic of consumer culture, further explains: "We are so bombarded with other people's, other entities' attempts to impose meaning and value on things and, it's easy to forget, that at the end of the day, the real determiner of what value is to you is…you" (Young, 2009). The above experiments force users to think critically about the commodification process and about their value. They ask us to reconsider our relationship with music: how much is music worth, what do we use music for, where do we want to access music and what should it look and sound and feel like when we do? This kind of critical engagement with music is the moment afforded to us by the digital music commodity.

The promise of digital music, then, is precisely that it turns our attention towards the process of commodification. Despite the claims of digital music's immateriality and intangibility, the very material and tangible aspects of the digital music experience offer a greater, not lesser, moment to reconsider our relationship with commodities. Digital music, like countless other technologies, may never live up to all its promises. It may never fully disrupt the entire structure of the music industries or reduce the number of intermediaries standing between artists and their listeners. As much as digital music promises greater diversity, interactivity and control over music selection it also promises digital enclosures, proprietary technologies, surveillance and data mining. But digital music's less grandiose promise — to turn our attention back to the meaning and form of the music commodity and to re-engage us with the role of music in our lives — is already being realized.

For all the fears about file sharing and the devaluation of music as a commercial product, music will not likely escape its commodity form. In many ways, as the research here suggests, we do not want it to. The commodity form helps us make sense of the objects around us and eases the transition to new practices and technologies. Music, like other cultural commodities has a kind of double meaning to it. There is the meaning that comes from how a particular artist or song affects any given individual. But there is also meaning tied to the ways in which the music commodity appears and how it was acquired. Standing in line waiting for hours to get tickets to a show, rushing to a music store on Tuesday morning to hear the newest releases, or hooking up a microphone to a computer to digitize a song are just some of stories that form around the music commodity. Theses experiences are an integral part of music's effects and affects. The materials that make up the music commodity and define the contexts of its circulation mediate how users encounter and interact with the music it contains. This has not changed as a result of digitization. If anything, it is amplified. Experiments like *Skeletal Lamping* or *In Rainbows* hold promise because they turn our attention to this moment, where the commodity form and music meet. Consider for a minute, the following review of *In Rainbows*:

> Like many music lovers of a certain age, I have a lot of warm memories tied up with release days. I miss the simple ritual of making time to buy a record. I also miss listening to something special for the first time and imagining, against reason, the rest of the world holed up in their respective bedrooms, having the same experience. Before last Wednesday [when Radiohead released *In Rainbows* for download online], I can't remember the last time I had that feeling. I also can't remember the last time I woke up voluntarily at 6 a.m. either, but like hundreds of thousands of other people around the world, there I was, sat at my computer, headphones on, groggy, but awake, and hitting play. (Pytlik, 2007)

Nostalgia for the release days of old gives way to a realization that a new kind of social experience with music is possible with the digital music commodity. Not only had Radiohead's experiment successfully recaptured, at least for this reviewer, the pleasures of anticipation and acquisition that came with the CD commodity, it revealed the distinct experience the digital music commodity engenders. Although the stories we tell about digital music may not involve ritual visits to record stores or waiting for physical records to hit physical shelves, they will involve watching music play through the interfaces of software like Winamp, sorting and organizing music in countless ways thanks to embedded metadata, or seeing music circulate through a connected network of users like Napster. In these and other ways, the digital music commodity offers us its own moments of meaning-making; the stories we will tell about digital music will reflect the myriad of ways it can be embedded into different aspects of our everyday lives. *Skeletal Lamping* acknowledges that music has a social life that extends long beyond its commodity phase and far beyond its original intended uses. The tote bags, wall prints and floral patterns Of Montreal was peddling will persist and circulate in ways that are completely separate from, yet always rooted in, the music they housed. The band's experiment, along with countless others taking place across the music industries, reveal that there is still a desire for making exceptional objects and for creative ways of propagating them. Despite the potential limitations digital music poses, artists, hobbyists and users are using digital music to call into question the codes and conventions of music's commodity form. In doing so, they make visible the promise of digital music: to turn our attention to the commodification of culture and to force a reconsideration of the role music plays in the contemporary moment.

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