

## How does Technology Influence Online Music Access and Use? A Taxonomy of Empirical Studies

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### Abstract

*Based on the literature, a taxonomy of empirical studies that investigate online music systems is discussed in this paper. The studies presented discuss a number of related issues such as music sharing, security technologies like digital rights management (DRM), and changing business models. Research into online music systems is inherently cross disciplinary, and two main groups (industry/users) are identified to classify the research. The PhD research that this paper is based on has a user focus, however it is important to explore related groups and issues in order to adequately investigate. Therefore the taxonomy presented in this paper is significant as it provides an informative base from which to conduct further empirical studies into online music systems. To put the taxonomy into context, details of a current ethnography of online music systems is discussed.*

### Keywords

Digital rights management, empirical, music, Information Systems, Internet

### INTRODUCTION

Many will argue that the Internet has created a 'better world'. There is no doubt that it has opened up new opportunities for business to sell their products online, and it is a new and convenient way for people to shop from home or work. It is also creating significant challenges for established industry players (Premkumar, 2003), particularly those in the online music industry.

These new opportunities for the digital delivery of music have changed the way some businesses operate. New business models have been created but many organizations have been slow to adapt to this new commerce environment. It is suggested that the Internet removes distribution as a barrier to entry to the industry, thus possibly bringing "a flood of new players" into the industry (Porter, 2008). Competition to capture the paying music customer is strong as the industry goes through these major changes (Kretschmer, Klimis and Wallis, 2001).

As part of this changing online music space, global multinational corporations like Apple and Microsoft have moved in to fill the online distribution need. Apple Corporation particularly has been successful with their online music model, partnering with the major record labels to deliver music via their iTunes music store, which is software installed on a user's computer allowing access to their online store. Songs from iTunes can then be transferred to an iPod, Apple's successful mobile MP3 device for listening to music. Other corporations such as Sony and Microsoft have followed Apple's lead, with multi-million dollar partnerships, music stores and coupled mobile devices. Some say this progression can be seen as "a network of acquired and emerging entities that are each a shifting piece in the wealthy mosaic of communications and entertainment conglomerates" (Rosenblatt, Trippe and Mooney, 2002).

However not everyone is satisfied with this new 'online music industry'. There are reports that record sales are down because of file-sharing (Oberholzer and Strumpf, 2004) but at the same time, many people are seeing less and less value in the digital MP3 artifact (Sterne, 2006), with them often being referred to as temporary or throw-away items. It is then not surprising that a significant proportion of the online population are using unauthorised file-sharing sites to get music for free (Skageby and Pargman, 2005; Andersen and Frenz, 2007).

To get a better understanding of the research that explores this new 'online music industry', this paper presents a taxonomy of empirical studies that investigate online music systems. Two main groups (industry/users) are identified to classify the research. The PhD research that this paper is based on has a user focus, however it is important to explore the related groups in order to adequately investigate the issues. Issues such as music sharing, security technologies like digital rights management, and changing business models are central to the discussions.

To put the taxonomy of the literature into context, details of an ongoing ethnography of online music systems is discussed. The ethnography is a PhD research project (referred to as 'the ethnography' in this paper) exploring 'Digital Rights Management and the Online Music Experience'; investigating the way technology is changing how people access and use online music. A number of groups are studied in the ethnography: students are the music users at the centre of the study, contributing to twenty interviews and three focus groups. Musicians and a number of music industry stakeholders have also informed the study through interviews; musicians (five) and music stakeholders (ten) gave their perspectives about the current state of the music industry in Australia and globally, and how the emergence of digital distribution has changed the way music reaches the end user. Additionally, observations of an online community contribute to an understanding of online music access and use. An underground file-sharing community was observed over 120 days; with Apple's well-known iTunes Music Store being used as a reference point for discussion. Data collection is now complete and a number of issues raised in the literature review have been studied, including DRM and the related legal and ethical issues. The ethnography is not discussed in detail in this paper, however it provides context for the discussion of the literature and the taxonomy.

The research for this paper is significant for a number of reasons. Firstly, the use of both authorised and unauthorised online music is growing at a rapid pace and an entire industry that supports it is emerging. Secondly, in the context of this growth, there has been little research on how people use different music distribution systems; how the online environment is shaping the user experience; and the impact various technologies such as digital rights management may have on use. In terms of technical qualities, usability and interoperability have been identified as a major limitation of current systems.

## **METHOD OF RESEARCH**

As indicated earlier, this paper is part of an ethnographic PhD study in Information Systems that investigates systems for online music access and use. Social Informatics (Kling, 1999) is used to guide the investigation of the role of information and communication technologies in online music activities. The Work System Method (Alter, 2006) is used for evaluating music systems and Actor-Network Theory (Callon and Latour, 1981) is used to explore activities and relationships in the music network, however these analyses are outside of the scope of this paper.

This paper presents a taxonomy of empirical studies, which is based on an extensive literature review completed for the PhD. Since the beginning of the PhD, Nvivo qualitative research software has been used to manage the literature review; it has been a useful tool for this. The process of how Nvivo was used for the literature review is described in detail in Beekhuyzen (2007). That paper presents seven steps to conducting a literature review using Nvivo, with the literature review for the ethnography providing an example. The steps are: install the software, read and summarise the literature, import literature, coding 1st round, structuring nodes, coding 2 round, analysis. Most of these steps form an iterative process. This paper builds upon the discussion presented in the 2007 paper.

It is important to acknowledge that studies about online music access and use within a technology context are rare, and few empirical studies have been published. Even fewer have been published that provide a cross-section of perspectives to understand contemporary uses of music on the Internet; it requires an understanding of the technical, social and legal aspects, as well as perspectives from music users, artists, producers and the record industry. The PhD study attempts to bring these perspectives together, and the taxonomy presents relevant empirical studies, relative to their focus. The two groups identified are 'Users' and 'Industry'. Studies focusing on user activities related to accessing and using music are classified as 'Users' in the table (see Appendix A), and those relating to the state of the industry (including activities of record labels and artists) are classified as 'Industry'. The 'User' group is further classified into two main sub-groups, 'General' and 'File-sharing'.

As discussed in detail in the following section, there is a lack of research in the area of online music systems in general, and not surprisingly, there isn't a well-established body of literature on the topic in the Information Systems discipline. Therefore it was necessary to read widely across other areas such as intellectual property, business, sociology, and human computer interaction. The resulting taxonomy presented in this paper was produced to provide a literature base for doctoral studies in Information Systems.

The PhD research as a whole contributes to the literature and to theory as a qualitative interpretive ethnographic study using a variety of methods to study the access and use of online music. The PhD study, put within the context of previous empirical studies, will inform the design of new online music systems.

Steps in developing the taxonomy:

1. Literature review of empirical studies, and identifying the issues and subsequent themes in investigating online music systems;
2. Empirical studies were arranged into different groups and sub-groups based on their focus and then sorted by date.
3. Discussion of the themes identified throughout the different empirical studies conducted.

The next steps in this study (but outside the scope of this paper) are to complete the analysis of the empirical data collected for the ethnography using Actor-Network Theory.

It is important to note that ethical issues are also a significant concern in this research as it explores illegal activity in the form of unauthorised file-sharing. Studies investigating illegal activity are rare in technology studies, so particular attention was necessarily given to the anonymity of the participants and the communities being studied. Human research ethical clearance was gained for the study.

## **ISSUES IN INVESTIGATING ONLINE MUSIC SYSTEMS**

Authorised and unauthorised online music access and use is growing every year and an entire industry that supports it is emerging. Despite this growth, there have been few empirical studies exploring how people use different music distribution systems; how the online environment is shaping the user experience; and the impact various technologies (such as DRM) may have on use. Usability and interoperability are identified as a major limitation of current systems.

This research is important for practitioners and researchers alike. By putting this empirical study in the context of other empirical studies and the wider music industry, it can inform those developing online music systems and technologies; thus turning research into practice. However there are a number of issues that need considering.

### **Growth of online music and the industry**

Recent years have seen an explosion of online technologies as a way to access, listen and share music. The results of the Pew survey (2005) reported that 36 million Americans, or 27% of Internet users are downloading music or video files over the Internet; sharing music is not uncommon as “one in five downloaders has copied files from other people’s iPod or MP3 player”. This is in line with the findings from the Europe’s INDICARE project which reported, “29% of digital music users obtain music from online music stores” (Dufft 2005). Complimenting this research is the empirical study by Singh, Jackson, Waycott and Beekhuyzen (2005), which found that music users in Australia are on a continuum of use – ranging from only using unauthorised sources, to only using authorised ‘legal’ sources; some use a combination of both. Therefore it is important to explore the variety of activities in online music use, which is further justified by the Pew survey results that half of those users that download, use options other than paid online services/stores and peer-to-peer networks (Pew, 2005).

In 2005 in Australia, digital music accounted for only 1.5 per cent of sales but it is the fastest-growing segment of the music market (Sams, 2006). Research from IBISWorld suggests Australians spent \$60 million on digital music downloads in 2006 and it is predicted that this figure will almost double by 2010 (Hayes, 2006b). These figures suggest a need to have an understanding of how people are using digital music downloads, in order to improve the services on which they are delivered/distributed.

Worth US\$96 million in 2000, US\$200 million in 2001 and \$2.5 billion in 2005, the market for DRM technology and services has an annual growth rate of over 100 percent and an entire industry of technologies is emerging that perform digital rights management (Rosenblatt et al., 2002:x). Based on an analysis of forces that drive competition, the online music industry fits into Porter’s (1980) classification of ‘emerging’ industries and also has elements of his defined ‘global’ industries. Therefore it is also necessary to explore the industry that provides the infrastructure and delivery of digital music downloads.

### **Lack of research**

In 2003, Fetscherin and Schmidt (2003) argued that digital rights management systems were treated sparingly in the literature. Their opinion was that very few empirical studies existed about the usage of DRM or DRM technologies, and even though extensive theoretical literature existed about digital rights management, either by individual authors or DRM providers, these studies did not provide insight into how such systems are implemented and used.

Now five years later in 2008, the body of knowledge on music use and technology is still limited. The research is fragmented and much research done in private industry is not published publicly and easily accessible.

Therefore the empirical research foundation literature that exists is limited. This ethnography research builds upon this limited research and contributes empirically to a better understanding of online music access and use.

Most music users do not know what DRM is, do not know or do not really care about copyright (Pew, 2003) and are not well informed about the legality of their actions with respect to digital music (Dufft, 2005; Remington, 2006). The number of empirical studies of music and DRM is growing however research has mostly concentrated on separate topics and individual tasks, instead of focusing on users' overall personal activities related to digital music (Nettamo, Nirhamo and Hakkila, 2006). Other studies are interested in industry attitudes toward current DRM models and toward DRM-free distribution (Mulligan and Card, 2007). The ethnography examines the user's overall online music experience including the ethical, social and legal issues related to DRM.

There is also a gap in existing research to inform the development of music sharing technologies, and "there is a lack of understanding about users' actual practices surrounding music sharing" (Voida, Grinter, Ducheneaut, Edwards and Newman, 2005). To understand personal music activities, it is necessary to study the overall activities of how people retrieve, manage, enjoy and share digital music content, and the cultural differences that may influence such practices (Cunningham, Jones and Jones, 2004; Nettamo et al., 2006). This research examines the various music activities surrounding the access and use of online music.

### **Usability of online music systems**

A reported problem of online music technology is ease of use. Still relevant today, Alderman's book (2001) about Napster referred to a record executive's experience, "he joked about how difficult it had been to actually pay for and download a song, and counted thirteen steps a consumer had to follow just in order to get one song legally". Barub equates buying cultural products such as software and hardware to consume cultural products (such as an MP3) increasingly resemble going through an important security check when terror-alert is orange (2006:75).

From a consumer perspective and a fair competition perspective, music interoperability is important (Iannella, 2001; Dufft, 2005; Heileman and Jamkhedkar, 2005). The European Union has displayed unease at corporate powers and their coupling of music content, software and device (Reuters, 2007). This coupling, laced with copy protection technology such as DRM only allows music bought through iTunes to be played on a computer through iTunes software or on an iPod, thus restricting any interoperability. Apple's music cannot be played on a competitors (e.g. Sony) device. Competitors such as Sony and Microsoft have similar coupling systems and strategies.

The European INDICARE project found device interoperability is the key demand of consumers (Dufft 2005). The same survey found that consumers frequently burn, share, and store music files and that they are unlikely to accept digital music offerings that do not support this behaviour. Fetscherin also agrees that there are some "technological requirements as well as user rights restrictions which consumers might not accept when downloading legal content" (2005). Thus he argues "implementing control systems like digital rights management systems may make purchasing less attractive than copying for consumers as legal products restrict them in their usage" (Fetscherin 2005).

## **TAXONOMY OF EMPIRICAL STUDIES**

It is useful to study online music communities to understand how people are engaging online (Preece, 2000). There is much contention currently in the music industry as to the future of online music, and what form it will take (Keenan and Rooney, 2005). Legal incidents over copyright infringement from the sharing of content have prompted some commentators to question our treatment of Intellectual Property (as opposed to 'property' in its physical sense) in the digital age (Wang, Zhu and Li, 2006), and subsequently the validity of iTunes-like music stores who enforce security strategies such as digital rights management as the way of the future. Similarly, by gaining insight into the world of underground file-sharing, we can see how a large number of people who either don't agree with the current enforcement of Intellectual Property, or simply don't care, behave in a music community.

Although the discussion of the copyright of music is out of the scope of this paper, it needs to be recognised that online music is a very new industry, evolving out of an established and successful physical music industry (Swatman, Kreuger and van der Beek, 2006). The music industry as a whole is somewhat in a state of chaos, with many stakeholders testing a range of new business models to compete (Anderson, 2006; Vlachos, Vrenchopoulos and Pateli, 2006).

The two tables presented in Appendix A provide a taxonomy of the literature based on empirical studies of music access and use. They have been separated based on their focus into two main groups: Users/Industry, and the User group is further separated as General/File-sharing. General covers general and paid use; file-sharing includes unpaid/unauthorised use. The studies are further classified by their publication date, location of study,

authors, participant focus, focus of study and methods used. They are presented from the most recent studies completed.

The distinction between User/Industry is a useful one for the PhD study as users are the main focus, and those in the industry affect the way the users *use* music. Both perspectives are required to get an adequate understanding of how people use online music. The tables in Appendix A bring together a compilation of many of the empirical studies that have been conducted to date. The issues that these studies raise are discussed in the following section. The extremely thorough literature review covers important papers from across a number of disciplines. It is based on the literature review completed for the ongoing ethnography.

## DISCUSSION OF THE LITERATURE

The tables in Appendix A discuss music users and their online music activities. The activities discussed within the empirical studies, particularly those looking at peer-to-peer file-sharing communities, give interesting insight into what people are doing with music online in the era of the Internet. In critically analysing the empirical literature, a few themes were identified. Essentially the discussions point to the existence of a download culture, the sharing of music that the download culture like to engage and their personalisation of their music services; also that music users want interoperability and value for money, interoperability being one of the main arguments against DRM and behind the move to open standards. The analysis of the literature also points to some misunderstandings as to what digital rights management is, and how it enhances, rather than restricting, the music experience. The literature also suggests that students are those engaging most regularly in the downloading/file-sharing. Lastly it is important to acknowledge the possible stigma associated with researching and discussing online music access and use, and the challenge this type of research poses.

Users have a number of options for acquiring digital music: simply put by one author, either to pirate or to purchase (Fetscherin, 2005). Kasaras (2002) argues that the MP3 phenomenon should be examined as part of the cultural transformation that the Internet 'explosion' produces on a global scale. This view of the problem in the wider context is useful for examining actual music use and activities.

### Download culture

Music users want their music, like other media, on demand (Waycott, Jackson, Singh and Beekhuizen, 2005). About 36 million Americans, or 27% of Internet users say they download either music or video files (Pew, 2005). They listen to music on the radio, computer, television, CD player, or portable player, choosing the technologies they used depending on the context of use (for instance, listening to music on the radio in the car, through the computer at work, on the stereo at home, and through a portable device while in transit). In other words, participants make use of a number of technologies to ensure that music is available to them when they want it (Waycott et al., 2005).

A large-scale survey in Europe of nearly 5000 Internet users identified that 69% of all Internet users have experience with music on a computer. Particularly, younger Internet users frequently use their computers or mobile devices to listen to music. They found that "by far the most important source for digital music are CDs that consumers have either purchased themselves or CDs from family members and friends. Online music stores do not yet play a major role as a source for digital music: 29% of the European digital music users have obtained music from online music stores, but only 9 % frequently use them" (Dufft, 2005).

Also in 2005, the comparable Pew survey in the US reported that the "percentage of music downloaders who have tried paid services has grown from 24% in 2004 to 43% in 2005" however they argue that current file downloaders are now more likely to say they use online music services like iTunes than they are to report using p2p services "due to the stigma associated with the networks" (Pew, 2005). Confirming these figures, Sirotic's 2005 study of 15-17 year olds in Australia highlight how file-sharing is a small, but important part of daily routines and music use. "Teenagers use file-sharing networks as an informational, educational tool in music consumption, as well as it contributing to knowledge and dialogue in social encounters with friends" (Sirotic, 2005:2).

Consistent with their 2001 findings, the Pew survey in 2003 found that "more than half of all Internet users between the ages of 18 and 29 have ever downloaded music and almost 10% of those in that age group are online downloading music on any given day". At the same time, "Americans between ages 30 and 49 are also downloading regularly, with more than a quarter (27%) of Internet users in that age cohort reporting that they have downloaded music to their computers" (Pew, 2003). Sirotic argues that file-sharing supplements the way young audiences engage with music while also redefining the motivations and meanings of music.

The home domain functions as the central point when operating music devices, and the home PC acts as a music hub (Nettamo et al., 2006). Nettamo et al., found that content editing, ripping and transferring between platforms, as well as online downloading and sharing, happens at home. In general, music users see themselves

as honest consumers: their role is to purchase the music and use it in a way they considered to be fair (Waycott et al., 2005).

### **Interoperability and value for money**

The European INDICARE project found that device interoperability is the key demand of consumers (Dufft, 2005). The same survey found that consumers frequently burn, share, and store music files and that they are unlikely to accept digital music offerings that do not support this behaviour. Fetscherin also agrees that there are some “technological requirements as well as user rights restrictions which consumers might not accept when downloading legal content” (Fetscherin, 2005). Thus he argues that “implementing control systems like digital rights management systems may make purchasing less attractive than copying for consumers as the legal products restrict them in their usage” (Fetscherin, 2005).

The European survey also confirmed that consumers “don’t want all for free but they want value for money” (Dufft, 2005). The majority of users are willing to pay for music files that offer them more flexible usage rights, the ability to transfer files between devices, and the ability to share. Studies by Nettamo et al., (2006) and Singh et al., also found that users are willing to pay for music they believe is valuable to them. Dufft (2005) believes that users are not willing to give up their flexibility in the use of digital music, even if restricted content were offered at half the price.

### **Sharing and personalising music**

Sharing is an important consideration. The Pew survey of 2005 reported, “one in five downloaders have copied files from other people’s iPods or MP3 player. One in four gets files via email or instant messaging”. The 2003 results suggested that “two-thirds of those who download music files or share files online say they don’t care whether the files are copyrighted or not (Pew, 2003). However they do seem to want to do the right thing. The INDICARE project found that “P2P users who have discovered new music on the Internet, subsequently buy CDs or purchase music from online music stores almost as often as the average digital music user does” (Dufft, 2005).

Although listening to music is largely an individual activity, sharing music among friends is an important way for people to find out about new music (Waycott et al., 2005). Volda et al., (2005) present a descriptive account of the social practices surrounding iTunes music and sharing and argue that “the technical innovations pull the opportunities of design forward while political, legal and ethical considerations push those opportunities back”. They believe that one of the greatest challenges for technical innovation in music sharing may be in allowing designers to make the leap between treating music sharing technologies as personal music listening utilities and treating music sharing technologies as online communities” (Volda et al., 2005).

Music users enjoy personalising their music, organising the tracks according to their own lists which is made possible with digital media (particularly with an iPod) (Waycott et al., 2005), and Livingstone’s (2002) study situates media within the context of other leisure activities of the young person; within the home, family and everyday life. As mentioned above, in the US “one in five downloaders has copied files from other people’s iPods or MP3 player. One in four gets files via email or instant messaging” (Pew, 2005). 40% of Internet users own an MP3 player (Dufft, 2005) and owning an iPod has a strong influence on the tools chosen to retrieve, manage and share music (Nettamo et al., 2006). However until recently, it was illegal to copy purchased songs from a CD to an iPod in Australia (Hayes, 2006a).

Certain technologies made it easier to share music (for instance, by burning copies of CDs), although copying music is not seen to replace buying; rather it was viewed as a complementary activity (a way of finding out about new music so that people could be selective about what they buy) (Andersen and Frenz, 2007). File-sharing systems can also make it easy to share music, however Adar and Huberman (2000) found that in networks such as Gnutella, only approximately 10 percent of users actually share files with others. The accessibility of music makes a difference to how people use technologies and share music (Waycott et al., 2005).

### **Technical (mis)understandings**

Of considerable concern though is that “the majority of digital music users do not have the basic knowledge that seems necessary to make informed decisions” in their music buying activities (Dufft, 2005). “The majority of users is not well informed about the legality of their actions with respect to digital music” (Dufft, 2005). Consistent with the 2003 Pew survey “more than half of the digital music users either do not care whether the music they download onto their computers is copyrighted or do not know exactly what copyright means”. This is said to hold true particularly for young Internet users who are at the same time the most frequent users of digital music (Dufft, 2005).

In Europe, 63 % of users of digital music have never heard of Digital Rights Management, an additional 23 % does not exactly know what DRM is (Dufft, 2005). Further to this, 79 % of the users of digital music stores did not know whether the music they purchased was DRM-protected or not or whether any usage restrictions

applied. Of those that knew about usage restrictions, the majority did not know the details of the restrictions (Dufft, 2005).

### **Risky students and stigma?**

Something also important to note about music use, is that students are more likely to be music downloaders than non- students. "Fifty-six percent of full-time students and 40% of part-time students report downloading music files to their computer. Only a quarter of non-students report downloading files" (Pew, 2005). It is particularly important because this group of downloaders are perceived to have little understanding of the risks and consequences of their actions (Remington, 2006).

As identified by the Pew survey (2005) there is possible stigma associated with admitting to engaging in illegal downloading, thus it is important to note Cooper and Harrison's foundation (2001) paper presenting the results of the "first sociological analysis" on audio piracy subcultures. Taking a community perspective, they found that "audio pirates operate in complex and highly structured social and economic environment that has its own particular matrix of roles and norms". They found that audio pirates "utilize multiple (and often simultaneous) modes of communication and speak in a dialect heavily laden with technological jargon". They give a good description of the programs, networking protocols software, hardware and file formats that make up an audio pirates technical environment. However this 'audio piracy' sub-culture is just one of the sub-cultures identified in the literature review in this paper, with all of these sub-cultures presented here being given relatively little attention in the literature.

## **CONCLUSION**

This paper presents a literature review of the empirical research that has been carried out on downloading music and the underlying information systems and sub-cultures that form the music network. It is set within the context of a ethnographic PhD study investigating how technology is changing the way young people use music. It provides a useful taxonomy of the relevant empirical research to date (See Appendix A). The literature in the taxonomy is separated into two main groups based on the focus of the study: Users/Industry, and the User group is further separated as General/File-sharing. Both perspectives are required to get an adequate understanding of how people use online music, thus the extensive literature review crosses a number of disciplines.

The paper discusses the emergence of a download culture, and how the lack of research in the area, compounded with usability issues and the unstable and volatile nature of the industry at this point in time make for a complex situation. Specifically, the taxonomy leads to a discussion of the identified issues of interoperability and value for money, as well as sharing and personalising music, and the technical (mis)understandings associated with a user's interactions with online music. Students have been identified as the group most likely to download music, and it also highlighted that there is often stigma associated with downloading music illegally. Online piracy cultures often have their own cultures, as may the groups that access legal music. These ethical, social and technical issues will be explored further in the next stage of this research, and they are a useful way to investigate the online music phenomena.

And these issues discussed here provide insights that informed the ethnography. Within a download culture, it is interesting to explore the cultural norms, rules and rituals of individuals who anonymously participate. It is also interesting to consider the motivations and behaviours of the system administrators. Who does actually participate in these communities? How much time do they spend? What are the incentives for participating? Where is the value?

A lack of understanding of what users want to do online leads to usability and interoperability problems. Users want to be able to use their purchased content when and where they desire, without intrusive restrictions. Studies have clearly shown that users are willing to pay for content that they find valuable. The ethnography focuses mostly on student use of online music, and the possibility of stigma was carefully considered and incorporated into the data collection. For instance, in the focus groups and interviews, care was given to enable the participants to feel unjudged and comfortable sharing their opinions. These identified issues contributed to the design of the research.

Based on the literature, the empirical research that has been conducted on online music access and use is presented in this paper. The taxonomy provides a useful collection and discussion of the studies and serves a specific purpose for the overall PhD; it informed the study's focus, methods, and design. At the time of this paper's publication in December 2008, the ethnography is essentially complete. Early findings give insight into the norms and rules of file-sharing communities, and information about the preferred ways of accessing and using online music. Future papers will discuss the outcomes of the research.

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**APPENDIX A**

Table 1. Empirical studies focusing on Users music activities, and classified as General Use or File-sharing

Date	Location	Authors	Participants	Focus of study	Method
<b>USERS – GENERAL</b>					
2006	Europe (Greece & UK)	Vlachos, Vrenchopoulos, Pateli	25 consumers ( <i>and music execs below</i> )	Moving traditional business models to mobile	Interviews
2006	New York & Hong Kong	Nettamo, Nirhamo, Hakkila	12 music users	Mobile music use	Interviews Mobile diaries
2005	US	Voida, Grinter, Ducheneaut, Edwards, Newman	13 iTunes users	iTunes use and sharing aspects	Interviews
2005	New Zealand	Cunningham, Jones, Jones	15 hrs obs in 8 music stores 5 participant obs 1 focus group (4 users) 9 interviews (8 adult/1 child)	Music information retrieval	Observations Interviews Focus groups
2005	Australia	Singh, Jackson, Waycott, Beekhuyzen	23 consumers	Music use and activities	Interviews Focus groups
2005	7 European countries	Dufft (INDICARE)	4852 Internet users	Consumer issues on DRM	Survey
2005	US	Fetscherin	174 students	Consumer acceptance of DRM	Survey
2005	Australia	Sirotic	11 x 15-17 year olds	User experiences in online filesharing networks	Interviews
2005	US	Pew	1421 adult Internet users	Internet and music use	Survey
2003	US	Pew	2515 adult Internet users	Internet and music use	Survey
2002	12 European countries (UK)	Livingstone	160 children Parents Heads of IT teaching	Young people and media use	Interviews Survey
<b>USERS – FILE-SHARING</b>					
2007	Canada	Andersen, Frenz	2100 respondents	How p2p networks influence music purchasing	Survey
2005	Europe	Skageby, Pargman	P2p network for 6 months	Gift giving behaviour	Observations, forums
2004	US	Oberholzer & Strumpf	P2p network for 17 weeks	Music sharing, Impact on sales, network use	Observations
2003	US	Adar & Huberman	Gnutella p2p network for 24 hours	Music sharing, impersonal networks	Observations
2001	US	Cooper & Harrison	Mp3 sharers in IRC chat environment	Subcultures, assumed persona of 'pirate'	Observations

Table 2. Empirical studies focusing on Industry (record labels, DRM providers etc.)

Date	Location	Authors	Participants	Focus of study	Methods
<b>INDUSTRY</b>					
2007	Europe	Mulligan & Burstein (Jupiter study)	Unknown	Attitudes to DRM	Survey
2006	Europe (Greece & UK)	Vlachos, Vrenchopoulos, Pateli	19 executives from music content providers ( <i>and music users below</i> )	Moving traditional business models to mobile	Interviews
2006	Europe (Germany)	Swatman, Kreuger, van der Beek	Music and news providers 340 surveys 112 interviews	Changing business models	Survey Interviews
2003	Europe	Fetscherin	10 DRM providers – film, print and music industries	Changing usage rights of DRM	Survey Emails
2001	Europe	Kretschmer, Klimis, Wallis	100 interviews with music companies	Multi-national and independent companies Business models	Interviews

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