The Use of Conventional and New Music Media: Implications for Future Technologies

Barry A. T. Brown[1], Erik Geelhoed[2], Abigail J. Sellen[2]

[1] Department of Computer Science, University of Glasgow, Glasgow, U.K.

[2] Hewlett Packard Labs, Stoke Gifford, Bristol, U.K.

Barry@dcs.gla.ac.uk, {abisel, eg}@hpl.hp.com

Abstract: A number of new technologies such as the MP3 music compression format and the Napster file sharing network are creating new opportunities for consumers' activities with music media. In this paper we explore current practice with both conventional and new forms of media in order to better understand what the future may hold for music consumers. We interviewed 36 music enthusiasts: 12 teenaged and 12 adult conventional music users, and 12 early adopters of MP3 technologies. The results show that rather than new music technologies replacing the old, they supplement current formats by allowing users to exploit a different set of affordances. We discuss these uses drawing implications for new music devices, services and software.

Keywords: Digital music, MP3, affordances, new media, tangibility

1 Introduction

The development of the Internet over the last ten years has caused much excitement as well as considerable consternation in many traditional industries. The latest to feel this wind of change are the media production and publishing industries. Although the peer-to-peer file sharing systems "Napster" and "Scour Exchange" are, at this time, *sub judice*, the digital distribution of media has the potential to radically change many existing means of media production, distribution and consumption. For the end user, these changes offer new devices and services for finding, obtaining, viewing, listening and sharing media be it at home, at work, or on the move. The large number of digital music players (or "MP3 players", from the name of the popular MP3 digital music format) being sold is one example of the impact of these changes. In addition, the increasing availability in digital form of other kinds of commercially produced media such as books, magazines, films and photographs are spawning new kinds of viewing appliances and internet-based services, all with their accompanying concerns over copyright and security.

In this controversial environment we would argue that to understand where these changes are headed, and to pinpoint where opportunities for technology development may exist, it is best to start with understanding the needs and activities of users around currently available technologies. It is, after all, largely the consumer who determines what will or will not succeed in the marketplace and how these new media will be used. We chose as a starting point to focus in on music media. One reason for this was that, in addition to seeking to understand how end consumers use conventional media formats, we wanted to investigate the changes already occurring when new digital distribution technologies are adopted. There is now a large body of research exploring the effect of digital technologies on document use. But documents aside, the uptake of new digital music media is in many ways leading the field compared to other, richer media forms. Partly this is because digital music can be easier to distribute than media which combine audio and visual material since it is relatively compact. Users of digitally distributed music are also forming a fast growing market segment, and, while they still account for a small proportion of the music purchasing public, it is quite easy to find these early adopters. Looking at new music media and contrasting it with the use of more conventional media forms may therefore be something of an early indicator for how other multi-media types will be affected by technological change.

The specific aim of this study was to uncover the details of people's behaviour with music media to try to draw from this implications for the future. A particular focus was how the affordances of different kinds of music media (e.g. tapes vs. CDs vs. digital music files) and enabling technologies (e.g., different devices and services) play into these activities. To do this we wanted to begin by looking at the whole "lifecycle" of how consumers use music, from how people first find out about it to how they obtain it, listen to it, share it, organise it and collect it. We recruited 36 UK music consumers and used a combination of interviews and rating scales to probe aspects of this lifecycle. The participants were all music enthusiasts, covering both adult and teenaged consumers, and conventional and early adopters of MP3 technology.

2 Literature

With regard to music, the literature falls mainly into two large and well-researched fields: musicology and cultural studies. Musicology considers music itself as its object of study, for example investigating classical, popular and non-western musical styles (Bennett, 2000). Within cultural studies, there has been more of a focus on the attitudes and uses to which music is put in different cultural groups (Gay et al., 1997, Longhurst, 1995).

Group	No.	Criteria	Av. age	% Male
Teenaged conventional users	12	> 11 music purchases a year and age <=20. No use of MP3 files.	16	42%
Adult conventional users	12	> 11 music purchases a year and >=age 20. No use of MP3 files.	30	42%
MP3 early adopters	12	> 11 music purchases a year. Must listen to MP3 files > 5 times a week	27	71%
Total	36		24	56%

Figure 1: Description of the 3 groups of participants

While both these areas are fascinating in themselves, for those of us interested in the future of new technology, they are less useful. For one thing, there has been very little attention paid to the mundane details of the use of music media from a consumer's perspective: Where do people listen to music? With whom? What activities take place in conjunction with music listening? How is music acquired? Why do people choose one form of music media over another? For another, such studies are not carried out with an eye toward design of new technology. When we look to the fields of HCI and the technology design community, we find very little

research on music media. There are a few notable exceptions however, including research on interfaces to music devices (Pauws and Bouwhuis, 2000) and on tangible interfaces which incorporate music choice into social spaces (McCarthy and Anagnost, 1998). It seems, then, that there is a need for some basic understanding of how music consumers use music media, both new and old.

3 Method

We recruited participants from people we defined as "music enthusiasts". The rationale for this came originally from an analysis of market data collected in the U.K. by Mintel (Mintel, 1998). Mintel's survey asked consumers how many music products (singles or albums) they had bought for themselves in the last year. These data show that while only 16% of the population make eleven or more music purchases a year, this relatively small group accounts for 65% of the total number of purchases made in the market. It seemed to us, then, that understanding this influential part of the population may be a good first step to determining what the future might hold in terms of consumer behaviour. We therefore began by screening for participants who fell into this category.

We then further subdivided this group into 3 subgroups: teenaged users of mainly conventional music media (e.g., CDs, vinyl, and tapes), adult users of mainly conventional music media, and a group of digital music early adopters (mainly heavy MP3 users). The selection criteria are summarised in Figure 1. The reason for looking at teenagers as a separate group was that age 15-19 year olds are much more frequent purchasers of music than older age groups (Mintel, 2000). We also predicted that there might be some interesting differences between adults and teenagers in terms of social behaviour around music.

4 Procedure

Because the aim of our study was to uncover the details of music behaviour across a broad spectrum, we chose to rely mainly on an in-depth interview technique. The questions were designed to probe a range of activities from first awareness of music through to collecting and archiving behaviour. As much as possible we also tried to unpack specific examples of participants' activities around music. So, for example, we asked participants to describe the last three times they had purchased or listened to music. Here the focus was not just on their interaction with the music but also on details to do with the context within which the activities took

place (such as where they were, who they were with, and what other activities they were engaged in). A slightly more extensive set of questions was designed for the MP3 group appropriate for the kinds of new technologies they were using.

In addition, rating scale questions were interleaved with open-ended questions. These rating scales covered aspects of the same spectrum of activities. The purpose was to collect some quantifiable data across the sample of 36 people with regard to a variety of key aspects of their behaviour to and to complement the qualitative data in other ways (e.g. to aid in selecting representative quotes and to detect differences between the 3 user groups.)

In total, participants were interviewed for 1 to 1½ hours and on completion were given music vouchers for their participation. All interviews were audio-taped and transcribed. Rating scales were subjected to simple descriptive analysis (means, histograms etc), as well as analysis of variance (ANOVA) for group differences.

5 Results and discussion

The results confirmed that participants in all 3 groups were enthusiastic and indeed passionate about music. Not only did they rate themselves so (with a mean of 83.5 on a 100 point scale from "not at all" passionate to "very"), but they showed this in other behaviours. On average, participants bought 3.6 music products per month (about 40 a year). Further, the majority of participants took great pride in their collections which were in most cases quite extensive, with some people owning as many as 500 CDs, 350 tapes, and 550 vinyl records.

Here, looking at the breakdown of media format
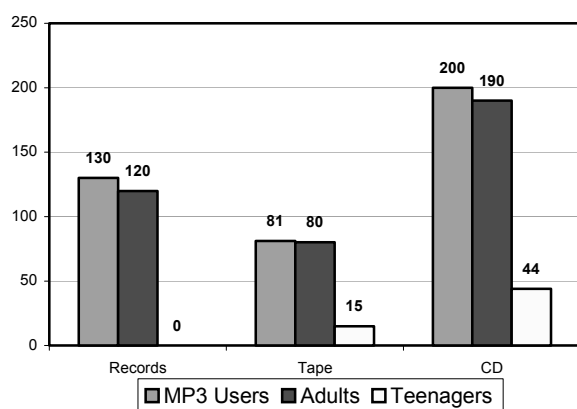
Figure 2: Format and collection size by group

by user group is quite interesting (Figure 2). On average, all three groups owned more CDs than vinyl or tapes, but not surprisingly, teenaged users had less of everything being only at the beginning stages of collecting. Perhaps more surprising, though, is the fact that the MP3 group and the adult conventional media users were not significantly different from each other. Most notably, the MP3 group owned as many CDs on average as those who relied solely on these conventional media for their music. (These results were confirmed using: a 2-way analysis of variance showing main effects for both format ($F_{(2,58)}$= 5.91) and user group ($F_{(2,29)}$=4.93) with no significant interaction; and also 1-way post hoc tests finding differences for format only between number of CDs and the other 2 formats, and only between the teenagers and the other 2 groups.) It seems then that MP3 use and ownership, at least for our sample, did not appear to *replace* but rather to *supplement* conventional media. Our 12 MP3 users in addition to these media formats owned (stored) anywhere from 10 MP3 files up to 5000.

Looking more generally at any quantitative or rating scale findings, there were very few differences amongst the 3 user groups. In fact, with the obvious exception of the activities MP3 users carried out using MP3 technology (which we will come to later) there were no differences between the conventional adult group and the MP3 users. With regard to the teenagers, apart from the fact that they on average owned less of all types of media, the only other difference had to do with internet and email use. This was high for the MP3 group and overall quite high for the both adult and teenaged enthusiasts, but the teenagers indicated significantly less use, probably due to more limited internet access.

What the data do show is diversity of activity not so much amongst user groups but across different phases of the music life cycle. Here, for each phase, while there are interesting differences in attitudes and activities from person to person, there are also some common key findings which arise. It is these we now go on to discuss under 6 main headings: finding out about music, copying and compiling music, buying music, listening to music, choosing and organising music, and collecting music.

5.1 Finding Out About Music

Participants found out about music from a wide variety of different sources. When asked to rank order amongst a choice of 13 factors how they generally became aware of new music, hearing it at a friend's house ranked highest. In general, the role of friends in recommending and acting as "guides"

for new music had an important influence on what people later bought or listened to. One way this happened was through the swapping of compilation tapes made up by friends (see also (Willis, 1990)). This way of sharing music, although time consuming and cumbersome with most current technology, was particularly valued:

"All the cassettes and CDs that I treasure are the ones which are compilations. And it tends to be the way I get into a new music area. I recently have been getting into dance stuff because of John who taped his DJ collection for me and is gradually getting me into harder and harder stuff."

Along with this informal sharing, radio and music television such as MTV also ranked highly as a source of new music. However the radio in particular was a technology which was often talked about with some frustration. Due to its broadcast nature, the only way to control the mix of music played on the radio is to change stations. Participants came to know what shows would be likely to play music they might like, and not have heard, but found it difficult to fit their time around these programs. Moreover, they might miss or forget the name of the song or band before remembering to buy the music.

Interestingly, the role of the internet was not ranked as highly as one might expect in finding out about new music, even by the MP3 group. Five of our adult conventional users did report subscribing to band mailing lists or going to band web sites. For our MP3 music users, this also increasingly took the form of sampling MP3 tracks downloaded from the internet. But, while the internet was rated more highly by the MP3 group than by the other two groups (ranked 4th out of 13 factors), this was not the main medium by which they became aware of new music. The role of friends, radio and TV still dominated.

5.2 Copying and Compiling Music

All participants copied music on a regular basis, although the amount varied from individual to individual. Copying of music – or, more specifically, home taping – has been a source of controversy ever since cassette tapes became popular in the 1970s. During the 1980s, the music industry tried on a number of occasions either to ban new taping technologies (as with digital audio tape (Plumleigh, 1990)), or have levies imposed on blank tapes (Chestermann and Lipman, 1988). During these debates, surveys reported conflicting figures for the proportion of blank tapes used for illegal (sharing music with friends) vs. legal uses (taping

for personal use). In a recent UK survey, Mintel reported 15% of the population copied music on a regular basis (Mintel, 2000).

Perhaps unsurprisingly the major motivation for copying amongst our interviewees was to avoid buying. However, this is not to say that those who copied heavily did not buy. We found no significant correlation (negative or otherwise) between the amount of copied material people owned and the amount they bought ($r = .10$, $p < .66$). Indeed, copying seemed to be more something which extended music acquisition beyond buying rather than replacing buying. While this could be a feature only of our sample, Mintel has also reported that only 2% of their sample of the UK population copied music regularly but did not buy music regularly (Mintel, 1998).

The data suggest that one reason for this is that copying often provided a low risk way of experimenting with new types of music allowing people to "try before buying". Many of our enthusiasts talked about borrowing CDs from friends and copying them onto tape. After listening to the tape, they might then go out and purchase an original to replace the copy:

"That is one of the advantages of (home) taping, quite often you're not sure whether you'll like it enough to get it on CD but by taping you can listen to things and find out about a lot of different types of music and find out what your taste is."

Our MP3 users exhibited the same kinds of motivations behind copying, but took advantage of MP3 files to do so either by downloading from internet sites or by exchanging MP3 files with friends. Sharing files with friends often took place over intranets. For example, many of the university students we talked to had personal computers connected to the university network meaning that music could easily be shared between friends' machines. This method of sharing music is analogous to the borrowing and copying of CDs amongst friends that we saw with conventional users:

"You can [download songs] off the network. I discovered Stereolab, and I liked one of their songs and one of my mates said oh so and so got it on his computer so I went and had a look at that and he's got both albums on MP3 so I downloaded them off and listened to them."

Also, like the conventional music users, copying not only encouraged them to experiment with new music, but again did not appear to make them any more reluctant to buy CDs. In fact, some said that this had increased their music purchasing (a finding

also confirmed by other questionnaire studies of MP3 users (Jupiter, 2000)):

"I wouldn't say its cut down on my music purchases at all, in fact to a certain extent it would make me go out and buy it in a way if I hear something by an artist on MP3 if I like it that much I'll go and buy it."

"It's influenced which ones I buy. If I like it 9 times out of 10 I will buy it."

Unlike the conventional user groups, however, two aspects of MP3 use allowed these users to obtain music in new ways: first was the ability to search for specific tracks and second was the ability to download at the level of individual songs or tracks. Because of these features, MP3 users were able to compile somewhat eclectic collections of tracks:

"I think I downloaded a Quincey Jones song, the theme from "Minder" – don't know what came over me that night – and it would have probably been… Jolene by Dolly Parton. I wouldn't dream of going and buying them."

One MP3 users with a CD burner routinely built up such collections, burned them onto a CD. Other MP3 users also engaged in creative activities supported by the ability to "rip" music from CDs, vinyl and tape onto the computer. This allowed them to bring together collections of songs from CDs to be played in more flexible ways (such as randomly) as well as to enable them to copy compilations back onto other media such as CDs and tapes for personal use or for gifts. It appears then, that the impact of MP3 technology, at least for our sample, was not to impede buying but rather to encourage experimentation. It also enabled new sets of creative activities around compiling and sharing music.

5.3 Buying Music

When it came to the point of buying, participants in our study bought music both from conventional shops and over the internet. On average, they went to a record shop every two weeks and many talked about this activity with some fondness. They were seen as places to explore, to discover new music or to just browse:

"First of all they have the listening posts, so you just get to go round and listen to things, trying out new music which you wouldn't even have heard of on the radio or from friends. And then, I quite like CD covers, and I just like to look through them all. And you notice stuff that you used to listen to and that you've forgotten about. And you remember what you ought to get in the future. And also, its one of the few shops you don't feel guilty about just wandering about."

Ways of listening to music in record shops, such as "listening posts" or asking staff to play albums, were particularly popular, fitting in with a general need to listen to music before purchasing. These shops, however, were not always seen as ideal environments for this, since they can be both intimidating and busy.

While internet purchases still only contribute to 1% of U.K. music sales (although with fast growth rates (Mintel, 2000)) this method of buying was popular amongst our interviewees. The main reasons for this were convenience as well as cost, with many internet sites heavily discounting CDs. Purchasing over the internet, however, was a more focused activity than going to a record shop in that it was usually in order to buy a particular CD. Ironically, while people often talk of browsing the internet, when it came to browsing for music, our participants preferred record shops to the internet. This was even the case for MP3 enthusiasts. It seems, then, that the way most Websites are designed means they are less well-suited for serendipitous *browsing* and more for goal-directed *searching*.

5.4 Listening to Music

To our enthusiasts, music was an almost irreplaceable part of their lives. In particular, we asked what percentage of time our participants listened to music in the car, living room and at work. The car was the most popular place for listening to music (mean of 82% of the time), but participants also reported listening to music most of the time while in the living room (61%) and even 38% of the time at work. We found that there were three main motivations for the ubiquity of music in these enthusiasts' lives, which were common topics for all 3 user groups.

First, one of the key values mentioned came from the way that it could be flexibly combined with other activities enhancing them or taking the sting out of routine tasks. As one enthusiast put it, music is for when "your hands are occupied but your mind is free". Similar observations have been made about TV (Ellis, 1999), but unlike TV, the value of music as a soundtrack to other activities comes from the fact that it does not demand full attention but instead is a natural companion to mundane activities such as doing housework.

Second, music played a powerful role in helping individuals to moderate their moods. Our interviewees talked about choosing different sorts of music to either to enhance or to change their mood.

In a sense, music was used to smooth the transition from one activity to another:

"It depends what mood I'm in. If I'm about to go out somewhere, I'll listen to something busy. If I've been working all day it's usually something noisy that I can jump around to. [...] and if I feel like relaxing I'll listen to classical or jazz"

Third, while music played these important roles for people's own daily routines, the other context in which music firmly found its place was in social activities. For example, for the teenaged group, a common activity would be to go to friends' houses to play video games or relax. In these settings, music would always be played, providing both a way of moderating the mood of the group, as well as a forum for finding out about new music. As has been remarked before in the literature music for young people is very much tied up with the formation of their identity (Frith and Goodwin, 1990). Identifying with a certain type of music in turn is part of forming "who you are". Some enthusiasts felt that if someone liked the same music as yourself, this created an instant bond making friendship far more likely:

"There's an instant connection, like if I meet someone who listens to the early Verve stuff then I think there's something really important going on inside them"

Not only did our participants make friends with music, they also made music with friends. About one third of our enthusiasts was involved in some form of musical creativity, be it playing in a band, attending music workshops or DJing. As well as providing a leisure activity, this provided a forum for friends to meet and socialise.

5.5 Choosing and Organising Music

These then are some of the overriding reasons why people listen to and choose particular kinds of music. More mundanely, though, choice of music is also determined by what technology is available in the places it is listened to. In different parts of the home or outside of it, one has access to different sound systems and different collections of music media. In the car, for example, nearly all our participants had a tape player with a built-in radio. This limited their music listening to either the radio, or pre-recorded tapes. In the house, the standard set-up was to have a main sound system in the living room, with satellite systems of limited capability in other parts of the house. This meant that some rooms, such as the kitchen or bathroom, became exclusively radio or tape playing rooms.

These differences in technology across spaces meant that participants often faced the problem of managing the distribution of music media from one room to the next. Music would be carried around the house and be left in different distributed piles. One participant had even taken all his CDs out of the boxes and put them into a portable wallet so he could more easily carry his collection from room to room.

Different systems also meant that media would sometimes need to be copied from one format to another. For example, since most people held the majority of their collections as CDs, this entailed copying music onto tapes for the car. Our MP3 users would also "rip" CDs (digitise them into MP3) in order to have their collections available for listening to while at work.

Listening to music while outside the house generated further frustration for our participants. Portable CD players were seen as cumbersome, and portable minidisk players, while smaller, still suffered from a limited selection of music and added the further complication of another format. Listening to music in the car also had its own complications in terms of the dangers of theft, the high cost of car CD systems, and the problems of limited music selection. That said, music was an important part of making dull activities like commuting more tolerable and so risks and effort were seen to be worthwhile.

Inside the house, in terms of actually choosing from amongst a collection of CDs, some enthusiasts felt strongly about the pleasure of looking through the spines and selecting CDs to play. Others preferred to avoid this, and often left CDs in the player for days on end. Generally people had their collection stored a short distance from their main hi-fi, with a smaller pile close by. This small pile contained either new CDs, or ones they had recently played. While this simple form of pile management helped to restrict the search space when changing the CD participants also complained that it also presented an effort barrier to listening to music from the main collection. Another issue which arose was whether to listen to pre-recorded music or broadcast radio. Again, this was a choice somewhat dictated by the available technology, however it was clear that for some participants the radio served as a back-up source of music when they ran out of pre-recorded music since they would often be in situations where they only had access to a limited number of tapes (such as the car) or CDs (such as the kitchen).

To summarise, the diversity of technology across geography presented a number of obstacles to unfettered use and choice of music. This included

the need to carry around and organise a physically distributed collection, the need to copy across formats, problems in managing and searching large collections, and limited access to music in different locations.

5.6 Collecting Music

Finally, all our music enthusiasts were, to a greater or lesser extent, music *collectors*. The collecting of music was something which they took pride in. In many ways their music collection acted as a tangible presentation of their taste in music, expressing "who you are":

"Even if you can borrow books from the library, it's still nice to have books. Because your library expresses who you are."

This is part explains an interest which most participants showed in owning originals over copies – originals of good music indicate good taste in the owner of a collection (as has been observed in collectors more generally, (Belk, 1995)). Further, to some of our collectors, an impressive music collection was also a way of standing out. In this sense displaying the music collection was important, the collection saying things about us that it would be socially unacceptable to express aloud:

"I believe I've got optimal music tastes and I think my record collection reflects that. Other people should respect it! (laughs)"

However, this is not to say that all collectors were interested in the display. To some, owning the music itself was important over and above the ability to impress others. These individuals obtained great pleasure from "the hunt", from tracking down rare records, and spending a lot of their time in record shops:

"Yes I can spend quite a long time in [record shops]. I love it actually. It's really good fun because when you do find one that you like it's quite exciting. It's a social trip for me. I like chatting to the people behind [the counter]. I've made a lot of friends"

This collecting behaviour, from searching in shops, to storing, to displaying for others is perhaps inexorably connected with music as a tangible object. While it would be possible to simulate the collection of music with intangible digital objects, it seems unlikely that this could compensate for the whole range of activities involved in collecting physical objects, like CDs or records. This is not to say that collecting digital music files would not have its own attractions, but rather that it would be very different from collecting physical music objects. When we asked our participants about collecting digital files rather than physical music objects they

were generally negative, even those who used MP3 files extensively:

"I wouldn't be so keen on that [...] if everything is not physical then you've got worries [...] it will be harder to lend to friends who haven't got the technology to access your collection and also not having sleeve notes and things like that"

This suggests that there are some key advantages with having music stored in the form of individual tangible objects. Physical objects can be easily shared, viewed at a glance, physically purchased and given as gifts.

6 Implications For the future

The results highlight the ways in which different music technologies and media are drawn upon to support a whole range of both personal and social activities around music. This suggests a number of ways in which technology and its supporting infrastructures and services might move into the future.

With regard to finding out about music, there are already many internet-based initiatives which attempt to make this easier such as online music retailers that use people's purchases as the basis of recommending new music (Schafer et al., 1999). However, the results suggest that such services might be better directed at supporting the already existing processes of sharing and word of mouth amongst friends. This implies that the music industry might strive to encourage and support the sharing of people's personal compilations in recognition that this often facilitates rather than threatens the buying of CDs.

For example, a service might offer, for a small subscription fee, facilities to allow people to compile their own playlists and to email them to friends. These playlists could then be directly linked to on-line services which allow people to quickly and easily order the related CDs, recognizing that people often try before they buy. Following on from this idea, services could more generally promote people's ability to try before they buy by offering, within the same subscription, compilation services with limits on the number of times people can play any particular track. This view sees paid MP3 subscriptions as ultimately serving to replace conventional home taping.

With regard to learning about new music through radio and TV, the potential of interactive radio and TV come to the fore. Here the results suggest that there may well be value in audio and video on-demand functionality so that users have more control over what they listen to, and so that they

may be able to see upcoming programs or playlists. In addition, the ability to "bookmark" or even buy tracks from broadcast media such as radio is an interesting idea patented some ten years ago which is worth exploring more fully in the context of currently available networked technology.

When it comes to purchasing, the results have implications both for conventional shops as well as internet buying. Our study suggests that there are a number of (somewhat unsung) advantages to physical record shops in terms of supporting browsing and social activities. However, given the many advantages of the Web, there may well be opportunities to mix these environments. For example, kiosks in record shops could allow consumers to flexibly browse and search through the shop's music collection on-line, or alternatively to select tracks to listen to before buying. This could even be extended to providing "music bars" analogous to the way cafés in bookshops allow consumers to sample books before buying. In a music bar, consumers could select tracks to listen to in a café context. Designers might also explore ways of allowing people to capture information off CDs on portable digital devices so that people browsing the physical collection can bookmark albums to add to their personal wishlists or to listen to snippets from their own PCs or PDAs.

Looking at how people currently choose and organize music suggests some ways in which the design of music playing technologies might move forward. In particular, the problems of limited access to one's own music collection in moving around and out of the home suggest a range of benefits from having digital versions of one's collection being available in a central place, with various networked, digital appliances able to access the collection. There are obvious legal and copyright issues to be surmounted here, but those aside for the moment, such a system would bypass problems of copying music from one format to another and of managing different physical collections across locations. It would also allow a great deal of flexibility in how one choose to listen to music. This might include modes which play recently listened to music or music from the past; modes which select at the level of an album or at the level of single tracks; or modes which automatically compile selections according to mood, genre or event. All of this is not to say that such a system would be intended to replace the physical collection. Rather the this digital collection would be a supplementary system and one that is part and parcel of buying and owning physical CDs. Further, the

importance of artwork, sleeve notes and so on also suggests that the interface to such a digital system might draw more heavily on the use of graphics and more layers of information to support people's searching and browsing .

Finally, our results warn us that, as with the much heralded but yet to come paperless office, the movement away from physical music media may take longer than expected. Indeed, we would argue that it is in the mixing of physical and digital formats that many opportunities lie. As one example, we are currently exploring the idea of a "music book" – a CD sized book which contains a small electronic tag that uniquely identifies it. When the book is waved in front of a digital reading device, the album connected with that book is downloaded over the Web or is found locally and played. This artefact can be used just like a conventional CD, providing a tangible object to purchase and collect, or it can be used in more flexible ways such as allowing a "play once" format, which allows the music to be tried out, but not to be pirated. In this way, the music book combines many of the advantages of physical media with that of digital media.

7 Conclusion

The aim of this paper has been to understand the use of conventional and new music technologies from the user's point of view. Our findings have shown how different kinds of music media are appropriated and used in different phases of what we have called the music lifecycle. Central to these results is the conclusion that new digital music technologies are unlikely to replace physical formats. Whereas intangible, digital media formats bring many exciting possibilities for the enhancement of sharing and creativity, tangible media offer their own affordances in terms of browsing and collecting. Likewise, we are unlikely to see physical music shops superseded by internet shopping for reasons we have outlined. Rather, what the findings point to and what we have begun to describe is ways in which the physical and digital world can be brought together in interesting ways. Further, rather than placing barriers to copying and sharing practices, the music industry might seek to exploit these practices for their own benefit, recognising that the sharing of digital material might actually facilitate buying in the long run.

Acknowledgements

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