

Social & Personalized Music Discovery in a Social Medium

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Abstract

Technology gets simpler before it gets popular. For digital music the path to simplicity is just beginning. Today, things that should be easy in music players are complicated and awkward. People need to master multiple devices and deal with technical issues that could be handled automatically. Simplifying these matters will grow the market for digital music, but there are even bigger opportunities at the frontiers of extreme ease-of-use. From a consumer perspective, it should be much easier to encounter, discover and promote new music that delights and amazes. Making *that* really *easy* requires delving into the social dimensions of music. Our “music collections” will never be the same.

Digital music is at the beginning of a new, competitive period. Among music players¹ today, the bar for convenience and ease-of-use is set by the iPod® together with iTunes®, the online music store. The iPod is popular with affluent American consumers, who have personal computers and are comfortable connecting devices to them and using computers to order music online. Advanced as these arrangements may seem, there are many ways to make digital music simpler and more accessible².

The most obvious next steps are to smooth out today’s inconveniences. However, creating a ubiquitous and social medium for music is an even bigger opportunity.

Popularity’s Long Tail

At about the time I started writing this white paper, Tower Records announced that it was closing. Russ Solomon, the founder of Tower Records, started selling records out of his father’s Sacramento drug store in the 1940s. In the 1960s he opened a store in a six thousand square foot building in San Francisco at the corner of Bay and Columbus. The building was much larger than most record stores. As Solomon describes it³, San Francisco was a vibrant music scene. Many of its customers were kids who came to hear rock bands at the Fillmore or the Avalon. When customers came for recorded music by a band, Tower Records carried not only the most recent hit, but every album the band ever

made. Tower Records is what the industry calls a “catalog store” because it carries thousands of albums including most genres and many bands.

To understand what is happening in music it is important to understand the power law that describes popularity⁴. The popularity of many media products – including not only records but also books, movies, and many other things – follows a power curve. This means that at any given time, most of the popularity and revenue potential accrues to a very small fraction of the available offerings. Then there is a long tail of increasingly obscure tunes that are less well known and seldom purchased.

The power law shapes competition. One of the threats to Tower Records was the rise of mass discount stores, which carry just a few hundred albums at loss-leader prices. These stores focus on the big-selling hits at the top of the power curve and have a steady flow of customers that shop for other purposes. These stores reap much of the sales with a fraction of the shelf space.

How can retail work over the rest of a long tail? Even with thousands of tunes in a big retail music store, about half of the customers reportedly leave without finding what they want. For a catalog-style sales strategy to work in marketing the long tail, a retailer needs to carry a big collection, keep the shelf-space costs down and reach more customers. Big online retailers like Amazon (including their affiliates program) leverage the internet so that the products on their shelves can reach many more customers than regular stores.

A raft of news stories in 2005 noted another industry-changing event when Apple’s iTunes sales first made it to the US Top 10 sales list. At 99 cents per song, iTunes attracts the kind of impulse purchases and convenience purchases that used to accrue to record singles. At the 2007 MacWorld, Steve Jobs announced that over 2 billion tunes had been sold from its iTunes inventory of several hundred thousand.

Digital distribution of music has advantages for a catalog approach because it radically reduces the costs of “shelf space”. The cost of storing tunes on computer disks is a fraction of a percent of the cost of storing CDs on shelves in retail stores. Electronic delivery from the digital medium is inexpensive and immediate.

With perhaps 50 million tunes worldwide, what is in short supply is the attention of the consuming audience. How will we find music in the future?

In their 2005 book *The Future of Music*⁵, Kusek and Leonhard estimate that the potentially available worldwide music catalog is about fifty million songs. With the possibility of catalogs like this, the competitive factors governing the popularity and potential revenues shift beyond the competition for shelf-space. What is in short supply is the attention of the consuming audience. How will we find music in the future? If we have individually encountered thousands of tunes, how will we retrieve them again? In a universe of potentially millions of songs, how will we learn about songs that speak to us and that we'd like to add to our collection?

Ubiquitous Music

Ubiquitous computing began as a topic of research in the 1990's, exploring the idea that small computational devices embedded in our living environment could provide integrated information services. The hallmark of success was that the computers would "disappear"⁶. Thoroughly networked and integrated with each other, computers would gather and share information in support of our activities. In idealized scenarios, people would routinely use the services, but seldom notice the computers.

Ubiquitous music is a specific version of ubiquitous computing. Its main theme is thoroughness of integration. Today's music players are parts of larger systems that are poorly integrated and uncoordinated. For example, arranging to have particular tunes available in our living room does not automatically make them available in our car or away from home⁷. Consumers with multiple computers for playing music at multiple locations need to arrange to copy their collections from one computer to another and may need to register the computers with their music service. To carry a tune from one location to another we must carry our music player and reconnect it. Although a music player carries many more tunes than a CD, from a standpoint of effort this is similar to removing a CD from a player in the living room and carrying it to a player in the car⁸.

Taking convenience of ubiquitous music up another level, imagine that when we walk from our home to our car, the music comes along automatically, moving across devices

as needed. In principle, we should not need to carry any medium or device at all. Starting the car, we would continue to enjoy the music or program with little or no interaction or gaps⁹. The “system” would not only transfer the music or other digital content, but it would also continue playing where we left off¹⁰.

Marketing Music on the Internet

The MySpace website shows that the web can be used to promote music – where fans can link to their favorite bands and bands have web pages with music videos and samples of their music and links for downloads and purchases. Example websites range from basic offerings such as online schedules and previews that augment TV shows, to online fan discussions, games and promotional tie-ins, to sites like MySpace that help people to keep track of the interests and lives of their far-flung friends.

Online stores like iTunes and internet radio stations take steps in this direction. From iTunes it is possible to create play lists and send them to friends and to email recommendations to friends from the online catalog. Internet radio stations, such as Pandora, MusicMatch, and lastFM, provide customized streams of recommended music based on a starting sample or artist, as well as ways of buying music in various formats. It is possible to click on an icon of a tune that is playing or has played and be taken to an online store to make a purchase.

Online vendors now use data-mining techniques to generate automatic recommendations. For example, customers making a purchase at Amazon are regularly offered special deals at “check out” time. “People who bought this book also bought ...” “Based on your previous interest in this book, you may be interested in ...” Such profiling systems are also used by Netflix in producing recommendations for their viewers.

Another example is URGE from MTV Networks which seeks to be an immersive entertainment service. Built around Windows Media Player ® on personal computers, URGE is intended to enhance exploration and discovery of music using “informer” music blogs, down loadable play lists, artist interviews, and so on. URGE and MySpace suggest that the web can change how we encounter and discover new music¹¹.

From a perspective of extreme use, any extra steps and changes of context interrupt and interfere with the experience of exploring and buying music. When a consumer follows a link to order a CD, there are opportunities to hesitate and not make the purchase.

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Recommender systems aggregate information across populations of people who do not know each other. They are as good as their model of our tastes, their understanding of our playing habits, and their ability to group “similar” people and music coherently. None of these approaches tap effectively into our own social networks, or link us effectively with trend setters that we already respect.

Social Media and Social Capital

The growing buzz in new Internet companies is around social media. Social media tap into the basic human desire to socialize with friends and to share their interests. Media are more engaging when they enhance our socializing.

Stepping back from online experiences, music is a ubiquitous backdrop to social occasions. What is that music we hear playing? Perhaps a friend has interesting music tastes. We ask a friend, “What music do you listen to?” We visit new places beyond our usual haunts and encounter music genres that we had not noticed before (say) Acid Jazz or Abstrakt Beats. Someone tells us about a favorite band. Someone else has a play list that we want to explore. How could this be made simpler and more direct?

This genre of Acid Jazz and related music came to my attention when I asked my son what music he listens to now. He mentioned the online music station monkeyradio and his interest in Acid Jazz. Following his suggestions, I looked for sample tracks online. My outsider’s impression was that the genre was about ambient electronic sounds with solid percussion. Curious about its popularity, I took an email poll of friends to find out who listened to it. About half of my respondents had never heard of it, but pointed me to their own favorite edgy genres. A few pointed to “Groove Salad” and other Soma FM channels where they listened to it. One friend described the evolution of Abstrakt Beats

from late-80's house/club electronica music. He said that Trip Hop was big with raves in the mid 1990's with much bass and drum. Later, Acid Jazz in San Francisco combined jazz improv or jazz sampling. He said that Downtempo and Abstrakt Beats are part of the "Ultra Lounge" music scene in the cooler modern bars. How would my daily listening habits change if I could do my exploring quickly on a portable music player? What if I could check in with friends, gather up play lists and opinions from them, and get background information from people that they pay attention to?

Portable music players could be much more social and connected¹². Suppose that a performer at a concert can send a tune or a particular performance to everyone in attendance. Suppose that when I hear interesting music at a party, I can immediately get the play list – without needing to find the host and ask for it. In principle, the home entertainment system at the party could broadcast wireless information about "the tune playing now" or even the entire play list to everyone in the room. Any one at the party could tap their music player and get it.

Earlier at the party, the music player in my pocket could anticipate our interest and memorize the play list of the ambient music.

Taking the party music scenario up another level in ease-of-use, suppose that the first time I think about the party play list is after my wife and I get home and start planning our next party. The music player in my pocket could anticipate our potential interest. Earlier at the party, it could have memorized the play list of the ambient music—anticipating our future request for it. Later, we can browse through any music that we have encountered over time, exploring artists and tunes. Again, supporting extreme ease-of-use, the formats and sound quality are adjusted automatically to my gear, with no effort or attention on my part.

How can we simplify the process of recommending music? It is not unusual these days to see people talking on mobile phones when walking down the street or listening to music while they are doing repetitive exercises at a fitness center. Suppose I am working out at the gym and listening to a tune on my music player. It occurs to me that Dave might be interested in the tune I am listening to right now. In extreme ease-of-use, I could tap a big

button on my music player and say something like “Message for Dave. Dave – check out this new piece by Enya. I like it better than *Orinoco Flow*¹³.” Such ease of use is easily within the state of the art of current mobile phones, which can provide hands-free calls to anyone in our digital address book. The interaction is easy and direct because Dave is already in my music-related address book and the music player knows to include the current tune that is playing. My music system can package up the message and dispatch the tune to Dave’s music system.

Each of these variant scenarios – the party scenarios and the fitness scenario – simplifies the process of encountering, finding, and recommending music. This is the direction of extreme ease-of-use for music. In the language of e-commerce, we reduce the *friction* of sales. On the consumer’s side, there need to be some protections in place so that when we running on “automatic” exploring and trying music, we do not build up huge unexpected bills. Some of the intelligence and policies for purchasing music and getting it from subscription services needs to be built into the music system itself¹⁴.

In his book *The Tipping Point*, Malcolm Gladwell delves into the dynamics of how social trends arise through interactions of people in social networks. He characterizes “connectors” as people who know many other people, “mavens” as people who know a lot about something, and “salesmen” as people who are eager to get others to try something. These roles reflect common sense both about how we interact socially and how trends arise. It’s not just about “what you know” but also “who you know.” Gladwell’s book became the basis of seminars on social networks and marketing. Professional marketers such as those behind MTV work with related concepts, identifying thought-leaders and trend-setters¹⁵. Ronald Burt’s book *Brokerage and Closure* examines the role of social capital in markets and business organizations. Burt has been particularly interested in people who sit at the boundaries between social groups, carrying good ideas between the groups. Although they differ in specifics, these analyses of social networks all look at how informal and discretionary relationships matter and how advice, coordination and knowledge flow through informal relationships. As digital music becomes more of a social medium, we can expect the same kinds of phenomena for creating trends to play out their dynamics in social networks. Old versions

of a song may be rediscovered when new ones are released. Bands on the fringe may become visible after performing in a receptive community. Events like this are the ripples that can start a tune moving up popularity's long tail. As digital music is made easier to use and social actions become more lightweight, the processes that create "mini-hits" will accelerate. Artists and tunes would become more popular as information about them spreads. It would be like word-of-mouth advertising for restaurants, but much faster.

Digital music is massless. This makes it ideal as an exchange medium for social capital.

Digital music has many advantages for social media over earlier recording and distribution technologies. Crucially, it is massless. This makes it ideal as an exchange medium for social capital¹⁶ passed around among friends. Unlike vinyl, magnetic tapes and CDs, digital information can be transmitted and copied without transporting physical material¹⁷. David Kusek and Gerd Leonhard describe the musical future as "music like water." By this they mean that music flows all around us and is part of our social engagements all day long.

Social Personalization

In a world of mass production people like to personalize their gear – to better fit and display their individuality. Personalization in phones has taken the form of custom colors and ring tones. Musical taste can be a strong assertion of individuality. What could be more personal than our particular networks of friends or our musical tastes and the tastes of people that we find interesting?¹⁸

After we buy music, we can organize it in our collection. Common sense tells us that the only music that we can organize on our music player is music that we have already purchased. In the future, this will seem naively old fashioned. A hint of what is useful in "social personalization" comes from looking at how people routinely use email. Studies show that people organize their activities through their email conversations¹⁹. Mail folders display a time-ordered history of an activity and provide context for the files that travel as attachments on messages. Their email folders act as "to do" lists that organize their activities. To find a file in email people search back through messages. The messages provide both dates and context.

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Suppose that socializing and finding music could work the same way. Instead of email, this might be more like instant messages (IM) or a combination of IM, email, voice mail and phone calls connected to our music systems. Most messages would exchange gossip and music. On a daily basis, when I communicate with friends, I could easily play a tune (“Listen to this!”) or pass along a play list.

How would personalization change how we “organize” our music? Suppose that I wanted to find that music I talked with Dave about. Suppose that Dave is interested in sharing his current music tastes within his network of friends. The “system” could arrange that when I search my player for music related to my friend Dave, his latest play list shows up even though we haven’t explicitly talked about it. The system could automatically gather together music that Dave sent me, music I heard at Dave’s place, and music from Dave’s blog. My player would provide me an organization of tunes that is both an intuitive map to my music and a map to my friends. I could search by name or genre, or by the dates (and messages) where I exchanged the music or heard about the music from friends. I could find the music we heard when we were on vacation in San Diego. This is a move toward extreme ease-of-use for discovering and retrieving music. I could find music by remembering how or when I encountered it or who told me about it.

To enhance ease-of-use, there should be a seamless interface for music discovery across these different kinds of sources of music. This interface would bring together tunes from sources with different underlying rights and business models. It would show the music I “own” together with music I “rent”²⁰ and music made visible by my personal social network. It could include recommended music from online stores or subscription music services. It could include music supported by advertising. It could emphasize music recommendations according to how I rate the recommenders or according to how many of my friends are listening to or recommending it to me.

Such an information fusing interface for music discovery could be a centerpiece for music as a social medium²¹. Organizing music from friends' recommendations and ambient sources together with our "personal music collection" unleashes marketing power. Like the ads that appear in the Google searches search results, this information reaches people exactly when they are interested in making a purchase. This is the kind of convenience that online search companies are using to reshape the world of advertising.

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Information for social personalization is built up over time. When we listen to a tune, the system can record our interest. When we exchange music with friends, the system can incorporate them into our social network. When we go from our portable player to an entertainment system in our home, we don't want to have to recreate the personalization information all over again. Each music device is part of our integrated "music system"²². Personalization should travel with us and persist as we acquire new devices and add music distribution services²³.

Unlocking Social Media

Using computers and mobile phones as social media is almost a defining characteristic for how people in their teens and twenties approach technology. Social web sites like MySpace, YouTube, World of Warcraft, and Second Life did not attract millions of users because people in their forties and fifties wanted them. Each generation increasingly connects. Social media enhance our peripheral awareness of distant friends²⁴.

Digital player technology is moving in a direction that could support social media scenarios, such as with the wireless music exchange for Microsoft's Zune music player. A core issue stands out. How can "the system" enable people to explore new music and still meet the needs of the stakeholders?²⁵ To realize Social Media, it must be very convenient to exchange music and recommendations. This could happen either if there

were no ownership concerns for copies of music (i.e., no limitations of copyright), or if DRM systems for music were designed to enhance music sales through simplicity of use and interoperability.

In his article *Zune: it's not just the player stupid*²⁶ Stan Beer comments “When I heard that the time and number of plays limit also applied to non-copyright music as well, I figured Microsoft just hasn’t been able to get its system management software right yet. That must be the case, because really no company of Microsoft’s sophistication could be that stupid deliberately.” Steven Levy picks different issues in his assessment. He praises the ability of the Zune to squirt songs – but thinks that the limit of 3 plays in 3 days will annoy consumers. He also thinks that wireless connections should be used more to satisfy the “insatiable need” to know what music others listen to²⁷. At roughly the same time, Peter Jenner, Pink Floyd’s first manager gave an interview with *The Register* in which he complains (apparently based on experience with iTunes and DRM) that digital music pricing is a scam, that the big four music labels know that the DRM era is over and most countries will move to a blanket licensing regime²⁸. Beyond rants and spot news coverage of digital music and DRM, this area has become commercially important enough and complex enough so that there are now dedicated online news sources covering developments in the industry²⁹.

A common thread across many observers is that people want to use downloads to explore music. This speaks to values at the heart of social media and social personalization. It should be easy to encounter and discover music. The power comes from harnessing the social interactions of people who share their tastes in music.

Interoperability is crucial for helping social networks to scale³⁰. Only in the early days of railroads did train tracks from different companies have different sizes. Telephones would not work nearly as well if subscribers of one phone company could not talk to people who subscribed to a different one. Digital music will not reach its potential as a social medium if users are divided into “iPod users” and “Zune users” and others³¹. The experience from other industries is that business grows and consumers benefit when an industry adopts standards³².

No one (including me) knows exactly how the right balance will be achieved for all of the stakeholders. Social music discovery has the potential not only to transform how people discover music, but also to provide a potent mechanism for creating new hits or what Chris Anderson has called “niche-busters.”³³

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Conventionally, the “file system” on our music player provides an organization only for finding tunes and building play lists. Extending these interfaces to support music exploration enables viral marketing. Consumers benefit because they find interesting music more easily when their personal catalog becomes a platform for discovering music. Music brokers benefit because their recommended tunes can appear in the user’s context and they potentially gain information about a consumer’s tastes and preferences.

Interoperable DRM could mediate the playing and discovery of tunes and enable market-based pricing and rights. DRM technology would keep the rights and billing low cost, automatic and clear. On devices with limited memory, DRM could help guide automatic processes that manage memory space, giving the user perpetual access to tunes without requiring that they be constantly in local files. A user-friendly DRM system could also act on the user’s behalf by making sure that they never buy a tune that they already own, by managing arrangements where a tune is paid for incrementally across multiple plays, and by following the user’s policies for shopping for price.

Making it easy to discover and enjoy music appears to be what consumers want. Serving this need would help us to enjoy creative craft of our musicians, and lead to greater prosperity in the music business.

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Notes

¹ According to Bloomberg reports, market share of the iPod ranged from about 70% to about 90% through 2005. Some analysts predicted a substantial shift in sales to mobile phones in 2006. With the changing technology to a range of sizes of iPods, forecasters have not been accurate and at least through 2006 iPod sales in the aggregate have been strong. My own “seen-on-the-street” experience in the U.S. is that I see people listening to music on iPods all the time, never on a cell phone. In Europe and Asia, cell phones are more capable and used much more for music. The Apple iPhone and similar products will change the scene in the U.S. The upwards trends in mobile bandwidth and battery life will also change the landscape.

² Today’s users of digital music players must master not only their players, but also computers to manage their music collections and to order music online. They understand things that should not require their attention – such as how compression formats affect fidelity and how to install new versions of software. They do things manually that should be completely automatic, such as managing file space and downloading tunes.

³ Russ Solomon was interviewed for a National Public Radio program that aired on n October 3, 2006. The piece “Tower Records May Fall Before a Deal Is Done” was reported by Laura Sydell. An audio presentation of this story (<http://www.npr.org/templates/story/story.php?storyId=6189889>) was available online while this article was being written

⁴ Chris Anderson wrote a popular and compelling book on this subject: *The Long Tail: Why the Future of Business is Selling Less of More*. His analysis is that the tail is both long and thick – meaning that there are substantial sales to be made even far down the tail. One question is about where on the tail is the point after which there are basically no sales in a quarter. The informal buzz in the music industry suggests that with the kinds of inventories held by music-streaming companies about 12% of the tunes are not played at all during a given quarter..

⁵ See Kusek, David and Leonhard, Gerd. *The Future of Music: Manifesto for the Digital Music Revolution*. Boston, MA. Berklee Press, 2005.

⁶ Mark Weiser, “The Computer for the Twenty-First Century,” *Scientific American*, pp. 94-110, September 1991.

⁷ There are three interwoven issues here: (1) music devices are not thoroughly integrated as systems, (2) it is still too difficult for users to manage the registration and coordination of devices, and (3) Current DRM approaches manage rights to consumers based on a weak model of how devices are associated with consumers. Systems like iTunes and Windows Media mix together the authentication of users and devices. Some companies do not like user-only authentication because they see “passwords” as too easy to bypass. Approaches for multiple devices could be more secure if they took even simple measures based on natural physical constraints, such as recognizing that a user can be at only one physical location at a time. From a consumer-oriented perspective, the registration of devices could also be a lot simpler. See Smetters, D. et. al., Instant matchmaking: simple, secure virtual extensions to ubiquitous computing environments. *UbiComp 2006*, 2006 September 17-21; Irvine, CA; USA for an example of research into ease-of-use for security systems. Approaches like this are a right step towards the kind of extreme ease-of-use that bring us closer to realizing the ubiquitous music scenarios.

⁸ Although certain models from Audi and Toyota and other recent cars can be ordered with iPod compatibility, even these cars require plugging an iPod into the car. Plugging-in is also required in the various kits that attempt to retrofit an iPod or other music player into an automobile’s sound system. Compare this to what is possible in principle – such as having a music player automatically be wirelessly connected and recognized when it is brought inside a car and giving the driver hands-free voice control over it. Better yet, music could become available in the car just by virtue of a driver entering a car and the car synchronizing wirelessly to an online entertainment system.

⁹ Every step along the way is a small one from a technical point of view. Both the home and car entertainment systems could be wirelessly connected to the web, coordinated through a web service. Both systems would be initialized to the same person, or alternatively, a small tag carried by the person in a wallet could identify the person. The integrated music system could essentially “pause” the performance when the person was out of range, and restart it on cue or when they were settled at the next location.

¹⁰ The ubiquitous music scenarios stretch the limits of wireless connectivity. Not all wireless technologies are equal. The wireless hot-spot connectivity available at airports, coffee shops, and many places of

business is faster than what is generally available in mobile phones. Intel and other companies are promoting WiMAX, a next generation of 4G broadband wireless service for fixed and eventually mobile devices. This technology would increase bandwidth to 11 megabits per second for 802.11b networks, and 54 Mbps for 802.11g networks. This compares with 4Mbps for 3G networks. The downside at least for current Wi-Fi phones is that power management is not as well developed and phone batteries drain quickly. If this kind of technology is refined and widely adopted, it would enable ubiquitous music scenarios that are not so practical on today's mobile devices. Outside the U.S., higher-bandwidth cellular technology is increasingly available.

¹¹ One of the issues separating MySpace from the record companies has been the policy at MySpace that music downloads be unencumbered. Whereas the record companies recognize the potential marketing potential of MySpace, the disagreement about digital rights requirements means that consumers need to follow a link to a different site, where they can make a purchase. From a marketing perspective, every requirement like this is an obstacle to sales.

¹² One candidate for a digital music platform is music phones – which at least in terms of sales (but not usability) dwarf the number of music players sold worldwide. Gardner reported 180 million cell phones sold in the first quarter of 2005. *BusinessWeek Online* projected 780 million mobile phone sales in 2006, of which 194 million would be music phones. Projections for 2008 are 890 million phones, with more than half of them music phones. In practice, there are many confounding factors. Internationally, many countries in Europe and Asia are well ahead of the U.S. in the availability of 3G networks, which have higher bandwidth than most U.S. networks. This translates into slower and more expensive download times for music, and more severe trade-offs. High compression reduces download time at the expense of audio quality. For a discussion of the interlocking issues, see Yoffie and Merrill's report "iPod vs. Cell Phone: A Mobile Music Revolution" in the Harvard Business School Report 9-707-419, August 2006. A report by Michelle de Lussanet and Niek van Veen, *Mobile Music Needs a Tune-Up*, suggests even European phone services (which lead U.S. services in capabilities) have a long way to go catch up on the usability and flexibility of iTunes.

¹³ In his comments on this example, one of my colleagues exclaimed, "Who the h*ll listens to Enya at the gym?" It struck me that if he could have clicked on Orinoco flow in our email correspondence, he would be reminded that that piece moves along at a pace compatible with a cardiovascular warm up!

¹⁴ For example, the music system could have policies that check whether I already have music before buying it again. It could shop around for good prices. It could elect less expensive "try before you buy" approaches on tunes. It could favor music services that count "trial costs" toward future purchases. It could apply personal budgeting rules to warn me if I am exceeding budget limits.

¹⁵ The 2001 Frontline television documentary "The Merchants of Cool" shows the methods of marketing and social networks in action. It delves into the working methods for tracking and testing the tastes and aspirations of American teens.

¹⁶ The term "social capital" was popularized by Robert Putnam, author of *Bowling Alone*. There are differing definitions of the term as explored by various philosophers. A common thread is that people are located in a web of relationships – through their businesses, clubs, churches, and so on. They gain certain advantages from who they know and "invest" in various ways in developing and maintaining relationships. Some music download services such as MusicMatch, WeedShare and Peer Impact have experimented with ways to give people incentive points when they share music. In this way, these approaches go further in the direction of treating a social network as a kind of sales force. The question arises as to whether this practice would undermine the operation of a social network in the same way the pay-for-play practice has undermined the credibility of radio DJ's and has arguably led to stations with similar, homogenized music.

¹⁷ As Microsoft is proposing to explore with its Zune music player, this "copying" can be controlled in a way that enhances revenue opportunities for music sales and subscription services. In that vein, it is useful to think of this as a form of advertising, rather than as a basis of piracy.

¹⁸ A study of iTunes music sharing appeared in CHI 2005. Volda, A. *et. al. Listening In: Practices Surrounding iTunes Music Sharing*. Although this study focused on computer-based sharing in the work environment of a technical organization, it points to the desire of people to use digital music in social ways – even in an environment complicated by an overlay of corporate relationships.

¹⁹ See Belotti, V.; Ducheneaut, N.; Howard, M.A.; Smith, I.E. Taking email to task: the design and evaluation of a task management centered email tool. ACM Conference on Human Factors in Computing Systems (CHI 2003); 2003 April 5-10; Fort Lauderdale, FL. NY: ACM; 2003; 345-352.

²⁰ Subscription models from services like Napster and Rhapsody provide access to catalogs of tunes based on a monthly subscription fee. This differs from “owning” music in that the ability to play the music goes away when a consumer cancels the subscription.

²¹ As this article was being written, a start-up company Goombah launched its service. It offers a desktop download that analyzes the user’s iTunes collection. It then feeds recommendations from various sources based on music that like-minded other members enjoy.

²² An issue of putting all this functionality in a single music device is that its usability could suffer, reflecting the design compromises made to serve multiple purposes. An alternative to packing all of this capability into a single multi-functional music player is to have several small devices that coordinate with each other. When I do instant messaging or other communications from my cell phone, the information is seamlessly coordinated with all of my devices.

²³ At institutional scales, related approaches are exploited by academic libraries, which reduce the costs of storage and cataloging through networks of libraries.

²⁴ It is sometimes argued that older generations have also been online – more with phones and email. Some have argued that IM is for kids and email is for parents. All this banter aside, the trends toward increased connectivity seem clear enough.

²⁵ See Kusek and Leonhard’s book *The Future of Music* for a discussion of several fundamental trends that are reshaping the structure and economics of the music business. One early thread of struggle among stakeholders started with John Perry Barlow’s *Wired* article “The Economy of Ideas” in March 1994, where Barlow argued that it was impossible to contain digital works. Stefik published a response to this, “Letting Loose the Light” in his book *Internet Dreams*, published in 1996 explaining how to create trusted systems for digital rights management. Barlow, Stefik, and Larry Lessig debated related social and technical issues in an online forum hosted by Charles Mann in *Atlantic Online* in 1998.

²⁶ Found online at www.itwire.com.au/content/view/7091/983/ on November 13, 2006.

²⁷ See “Zune Should Go Beyond ‘Squirting’”, *Newsweek*, November 27, 2006, page 18.

²⁸ See “Big labels are f*cked, and DRM is dead – Peter Jenner” by Andrew Orłowski. Found at www.theregister.co.uk/2006/11/03/peter_jenner/ on November 6, 2006. The idea of a blanket-licensing regime is somewhat similar to approaches used in Europe where various devices and media for years, collected for redistribution to content owners to compensate for uncontrolled copying. Blanket licensing differs in that it is a tax on music rather than devices. A well-known difficulty with the approach is ascertaining an equitable distribution of royalties. The issue is that power laws have a very long tail and practical methods of sampling fail to produce fair distributions for rare events. The automatic accounting that could account for music usage is a big part of the work that could be done by DRM systems. At the same time, such accounting could provide the kind of relevant usage and preference data that could lead to satisfying and effective recommendation systems.

²⁹ See for example Bill Rosenblatt’s DRM Watch (www.drwatch.com) and Paul Resnikoff’s Digital Music News (www.digitalmusicnews.com).

³⁰ During the writing of this article, Apple together with EMI announced plans to distribute some music on iTunes where for a somewhat higher price per track, a consumer would receive music of higher fidelity that was not protected by DRM.

³¹ The interoperability issues for music players by different companies effects not just the interchange of music, but also the potential for integrated music systems where consumers have a variety of devices that coordinate and stay synchronized. The interoperability barriers arise from competition among platform vendors, whose main revenues come from sales of their music players. Stakeholders from other parts of the music ecology also have concerns. In broad terms, music labels are traditional in the terms of their licensing and sales agreements. For example, distribution agreements that place geographic limitations on sales are troublesome to people who buy media when they travel and run counter to trends in global digital networks. Beyond these business-induced issues, the technology barriers include the roll out of refined high-bandwidth wireless infrastructure and the development of music and communication systems that achieve extreme ease-of-use.

³² For example, the personal computer revolution was not just a revolution in how we use computers. Its rapid growth was enabled by the creation of standards for components – such as disks, memory, displays, and so on. This opened competition and fueled rapid growth. Companies depending on proprietary, closed systems missed the rapid growth of the industry and faded into obscurity.

³³ On the other hand, if Apple's approach to selling tunes without protection is combined with making music players that support convenient music discovery and sharing, the result would undermine the expectation that music is something that you pay for.