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A Survey of Web 2.0 Music Trends and Some Implications for Tertiary Music Communities

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Abstract

Over the past five years, we have seen the emergence of a new kind of website, built and populated with content in a collaborative fashion by its users, who are able to upload, tag, classify and comment content, which is subsequently submitted to a searchable online database. Such sites span the fields of music and visual media, and encompass outcomes as diverse as social networking sites, personalised Internet radio stations and encyclopaedias. Those closely involved in Internet communities have used the term ‘Web 2.0’ (O’Reilly, 2005) to distinguish such sites from traditional websites which are ‘read-only’ from a user perspective and have identified a trend towards a design principle based on the architecture of participation (O’Reilly, 2004) and a harnessing of the intellectual resources and creative outputs of the user base. These developments have not only transformed the user experience of the web, but have provided a significant vehicle for artists to find and grow global audiences outside traditional distribution channels. This has facilitated the growth of the ‘long tail’ music market (Anderson, 2006). This paper provides a survey of some significant recent trends relevant to music practice, and identifies some key questions and challenges that arise in music teaching, learning and research contexts.

1. Introduction

This paper charts recent online developments arising from the ‘Web 2.0’ movement and identifies some implications for the music discipline in tertiary institutions. Comparatively little literature exists to date in academic music circles on the impacts of this phenomenon, although there is widespread discussion of the social, economic and creative implications in technology journalism and online publishing and exchange (web forums, blogs etc.). In this spirit of the subject, therefore, this paper harnesses available online sources and the author’s direct involvement, both as a creator and consumer, in Web 2.0 music communities. It should be noted that the developments outlined here, although located in online contexts, have ramifications for all aspects of musical practice and are not specific to any particular genre. Web 2.0 and social media networks do not discriminate between musical cultures. They merely coalesce around, and reflect, the listening interests of the participants. It should also be noted that there are implications for both composers and performers in the emergence of Web 2.0. I prefer the generic term ‘producer’, as it implies someone who originates content (be it a composition or a performance) and seeks to connect that content to an audience.

2. What is Web 2.0?

‘Web 2.0’ is a term used to describe a second-generation style of web site or web service, predicated on collaboration and sharing between users.

Such sites have proliferated in the past five years and are now seen to represent a major shift in thinking about the Internet and its capacity to link creators and consumers of content. The term is understood to have been coined by Dale Dougherty, co-founder of O’Reilly Media, during the planning phases of what was to become the inaugural *Web 2.0 Conference* in 2004 (O’Reilly, 2005). The phrase was coined in an attempt to articulate a series of profound shifts in thinking about the Internet as a technological platform.

Rather than indicating a specific technological shift, as it might imply, the term is used to describe a particular approach to the world-wide-web that defines new relationships between producers and consumers of content. Many Web 2.0 sites are built, or at least populated with content, by the collective effort of their users. Perhaps the best-known example of these is Wikipedia, an online encyclopaedia founded by Jimmy Wales and Larry Sanger in 2001, which, at the time of writing this paper, contains over 7.2 million articles in 251 languages. By way of comparison, the largest commercial competitor - Britannica, has a mere 80,000 articles (Giles, 2005). These two encyclopaedias provide a clear example of the fundamental differences between the Web 1.0 and Web 2.0 eras and philosophies. Britannica has been created from the combined wisdom of a select group of acknowledged experts, building on a 200-year history. Wikipedia has been created from the combined and unfiltered wisdom of the online community in a mere six years. Due to the lack of a formal editorial process and the fact that anyone can be an author, Wikipedia has been disparaged by the academic community as an unreliable source of knowledge. A comparative analysis of accuracy in Britannica and Wikipedia was undertaken by *Nature* in 2005, in which a sample of 42 paired entries (one from each source) was analysed and compared by expert peers for accuracy. The analysis showed that eight ‘serious errors’ were found, four from each encyclopaedia, and that of the 42 entries, Wikipedia contained 162 “factual errors, omissions or misleading statements”, while Britannica contained 123 (Giles, 2005).

Whilst this study has been the subject of much debate and controversy ("Fatally Flawed," 2006) ("Britannica Attacks," 2006), it suggests that Wikipedia entries, whilst somewhat less accurate than Britannica, are not as unreliable as one might think and, given that Wikipedia’s repository of knowledge is exponentially greater than Britannica’s, it has become a force to be reckoned with in a very short period of time. Further analysis of Wikipedia accuracy indicates that the more attention an entry receives (and thus the more authors and editors), the more accurate that entry becomes. How is this so? The core principle behind Wikipedia and a range of other Web 2.0 services is that of harnessing the ‘wisdom of crowds’ to create a web resource built by its users, the functionality of which increases over time and as the number of users increases (Surowiecki, 2005). According to Stacy Schiff (2006), Wikipedia “is only five years old...one day, it might grow up”. Indeed, after the *Nature* article was published, the errors in the Wikipedia entries were promptly corrected (Wikipedia, 2007b).

In simple terms, Web 2.0 is problematising the traditional notion of the expert and the wisdom of the crowd has now risen to become a major force alongside the wisdom of the expert within the knowledge economy. This concept has a range of antecedents. Of the more well known are the user review and recommendation systems implemented by Amazon.com in the mid 1990s, which not only harvested information from users, but filtered and ranked the information on the basis of subsequent user activity (Was this review helpful? Yes/No), page views and purchasing patterns. This harnessing of the intellectual resources of the user base, along with data mining techniques can be seen to foreshadow some of the key developments of Web 2.0.

Other key Web 2.0 developments and activities include blogs (text, sound and video), wikis (Wikipedia), social bookmarking (del.icio.us), media sharing (YouTube, MySpace), music tagging, sharing and recommendation sites (Last.fm, Pandora.com). Many of these sites can be connected to other web services and users via data syndication technologies such as ATOM and RSS for the purposes of data aggregation and exchange.

What these examples have in common is that they are web environments, which connect users within an intelligent, searchable database system around shared interests, ideas, tastes and content.

The major concepts underpinning Web 2.0 can be summarised as

- The rise of individual production and user generated content
- Harnessing the wisdom of crowds
- The web as a platform
- Data aggregation and syndication on a large scale
- The architecture of participation (O'Reilly, 2004)
- Open collaborative, dynamic systems over closed static systems
- Support for niche markets and interests which aggregate globally

The following table, using examples from the O'Reilly Media website (O'Reilly, 2005), identifies some key movements from Web 1.0 to Web 2.0 services and practices.

Web 1.0	Web 2.0
Ofoto	Flickr
Akamai	BitTorrent
mp3.com	Napster
Britannica Online	Wikipedia
personal websites	blogging
domain name speculation	search engine optimisation
publishing	participation
content management systems	wikis
directories (taxonomy)	tagging ('folksonomy')

Table 1. Web 1.0 to 2.0 comparison - excerpt (O'Reilly, 2005)

Whilst web sites such as Wikipedia are clear examples of the Web 2.0 movement, they are of comparatively less interest and use to the music practitioner and researcher than other Web 2.0 developments. Before considering specific the impact of some key Web 2.0 developments on music, it is appropriate to first consider some of the major background developments in the music, entertainment and consumer technology industries.

3. The 21st century condition of music production and distribution

Since the mid to late 1990s, we have witnessed a period of change where the traditional models of music production, distribution and consumption have been profoundly challenged on an unprecedented scale. Some of the key developments can be summarised as follows.

Production tools have been democratised to the point that many musicians are now producing music with desktop tools in domestic environments. This has seen an explosion in content from both music professionals and ‘prosumers’ (Toffler, 1984), i.e. those whose online activities are located somewhere between the professional musician and the consumer. Ultimately, we have moved from an economy of scarcity, controlled by a finite array of publishers, to a theoretically limitless economy of abundance. We now need tools to filter, navigate and establish relationships between elements in this vast field of content.

The cost of distribution has been reduced to free, or near-free levels through digital distribution services, file sharing, peer-to-peer and social media networks. New large-scale web services have emerged which link music producers to consumers via artist similarity, taste profiling and recommendation data as well as linking listeners with shared tastes and interests. These include Last.fm, MySpace, Pandora.com and a range of other social media and networking sites. Included in this distribution network are a rising number of amateur and prosumer music blogs, which distribute and review music content and some of these are attracting significant readerships. Users can subscribe to blog sites via RSS feeds and podcasts and can aggregate content on their desktops according to a set of user definable parameters. In addition to this, social media sites allow for user tagging, rating and commenting of content. Following the democratisation of the means of distribution, we can see that peers and prosumers now represent a powerful combined force for taste-making, artist exposure and the establishment of relationships between content (Slater & McGuire, 2005).

Due to the low cost of distribution, and the absence of physical overhead costs, online services can now carry an ‘infinitely large’ catalogue and increasingly, the business models of online distribution are predicated on such a principle. As a result, a massive array of niche genres and out-of-print catalogue is available via online services and file sharing networks. Not only is the catalogue infinitely large, but also the shelf life of any one release is now infinite. The effect of the expanded catalogue has been researched and trends are emerging that listeners are expressing growing preferences for niche genres over mainstream genres. This has been termed ‘The Long Tail’ by author Chris Anderson in his book of the same name (2006). The term, which has its origins in statistics, refers to a supply and demand distribution where mainstream hit peak sales

constitute the ‘head’ (or ‘body’) with decreasing demand flowing through to a long ‘tail’ made up of lesser selling titles. This is represented graphically in Figure 1 below. Anderson argues that, due to digital distribution, the list of titles making up the tail is now phenomenally long. More startlingly, on the basis of research into sales data conducted in collaboration with researchers at MIT and Harvard, Anderson suggests that the sale of long tail titles now constitutes up to 40% of total music sales and appears to be rising (2006, p. 23). In keeping with this trend, the demand for mainstream hits has been reducing, suggesting that demand is gradually shifting away from the mainstream hits towards the diversified long tail area, which contains niche genres and lesser-known artists.



Figure 1. The Long Tail (source <http://www.jroller.com/page/croctech/20050406>)

The real evidence for the impact of digital distribution, peer-to-peer networks and the rise of the infinite catalogue can be seen in the intense struggle for physical record stores to survive. These businesses have fixed floor space and a finite catalogue and thus rely on solid sales of titles at the head of the demand curve to remain viable. In August 2006, one of the largest retail record chains in the world, Tower Records, filed for bankruptcy in the USA, citing accumulated losses of \$210 million (Fraser, 2006).

Whilst the Amazon.com and iTunes Music Store business models have been predicated on the infinite catalogue and, as such, represent early and well-matured examples, Anderson has provided a succinct summary of the underlying principles via his Long Tail theory.

Peer-to-peer (p2p) and other file sharing technologies have resulted in large scale illegal file sharing. Although the precise impact on CD sales is a subject of ongoing debate (Oberholzer-Gee & Strumpf, 2007), music is now considered to be ‘free’ by many internet users. Despite repeated attempts, the recording industry has been unable to stem this practice and is now looking at ways to monetise it. The ‘crowd’ has expressed a strong preference to use the Internet to find new music through file sharing and online social networks.

New portable media devices, such as the iPod, have proven to be extremely popular and, at commonly used bit rates, the larger devices have the capacity to hold up to 3000 CD titles. Due to the amount of storage space, the user is invited to fill it with (illegally)

shared content, assuming that it would be too costly to fill it with legally acquired content. Alongside this development is the rise in the practice of sharing play lists, which assumes that the mp3 files are readily available via legal or illegal download networks. The sharing of play lists is assisted by social networking sites.

In summary, the major developments can be identified as

- The democratisation of the tools for production
- The democratisation and diversification of the means for distribution
- The rise of social networking sites connecting producers and consumers and listeners with shared tastes
- The infinite catalogue and ‘The Long Tail’
- An exponential increase in the availability of ‘free music’ through illegal file sharing
- The arrival of large capacity portable media devices

4. Navigating the endless sea of content: classification, tagging and folksonomy

The immense impact of recent Internet technologies on the production and dissemination of music has given rise to a new set of problems that have needed to be addressed. The first of these is how to navigate the seemingly infinite sea of musical content in the long tail of production and how to address the problem of connecting producers and listeners.

A key development has been the emergence of user generated classification, or ‘tagging’ systems. These systems allow users to ascribe tags to audio, video and text objects in online databases. A ‘tag’ is a keyword or descriptive phrase than can be associated with items of content and is a form of metadata. This practice of user tagging and classification has been termed ‘folksonomy’ by Thomas Vanderwal (Vanderwal, 2005) and is now an extremely widespread practice in Web 2.0 spheres.

Once an item is tagged, it can be linked, via search engines or hyperlinks, to other items that carry the same tag or, in social networking music sites, tags can be used to generate play lists of online content. Further, the list of tags associated with a particular item can be aggregated and visualised so that the relative frequency of occurrence of each tag can be represented. This result is called a ‘tag cloud’ and this was first understood to have been implemented in Flickr (<http://www.flickr.com>) (Wikipedia, 2007a). The following diagram shows a tag cloud from Last.fm, attributed to the band Stars of the Lid. In this example, the larger the font, the more times the band has been tagged with that word or phrase.



Figure 2. Last.fm tag cloud (Source <http://www.last.fm/music/Stars+of+the+Lid>)

The tag cloud system was widely understood to have been implemented first in Flickr (<http://www.flickr.com>) a social media website for storing and sharing photographs.

Put simply, many Web 2.0 sites harness the intellectual resources of their users to tag and classify content, which enhances and makes the database more complete. In his blog site press release for the forthcoming book *Everything is Miscellaneous*, author David Weinberger (2007) notes;

For 2,500 years we've used the same principles for organizing information, ideas and knowledge that we use for putting away our laundry: Everything has its place, things are put with other things like it, it's all neat and tidy. But as we move information on line, it no longer has to share the limits on the physical. We are rapidly inventing new principles of order, moving from newspapers to blogs, from encyclopaedias to Wikipedia, from librarians to taggers. In fact, it turns out that the best way to manage digital information is *not* to have experts filter and sort it before hand, but to make a huge miscellaneous pile of it, include everything, and allow users to sort and organize it. This opens up new opportunities, but it fundamentally changes the nature of authority across all of our major institutions, including business, the media, science, education and government.

The tagging of music files in online environment is now extremely widespread and a number of Web 2.0 music sites invite the practice. Ultimately the motivation for users to tag content is to help make the database finer grained and richer, which in turn allows the same users to more easily locate content that matches their interests, or to locate items that share similar attributes to items they already find interesting. As with Wikipedia, a system or database becomes more usable and accurate in direct proportion to the number of users who contribute to the system and, by extension, to any individual item or entry. The more an item is tagged, the more accurately it is positioned, or linked to other items, in the database.

5. Web 2.0 Music sites: Last.fm

Last.fm is a comprehensive and large-scale social networking site, founded in 2002, built by, and around, music producers and listeners. A key aspect of its technological platform is a 'wiki', or a web content management system that provides all registered users the authority to contribute and edit content. Last.fm currently has more than 15,000,000 users worldwide. The Last.fm network operates on the principle of building communities around the musical tastes of its users, who are, more often than not, very active musical listeners. Taste profiles are built for each user via a plug-in which is downloaded and installed locally in the user's media player. The plug-in, originally called 'audioscrobbler', tracks music files played by the user and uploads this information to the user's profile online. Profiles are displayed as web pages with 'charts' updated weekly.

last.fm the social music revolution **Music** **Users** **Listen** **Events** **Charts** **Tools** Logged in as **JulianKnowles** **Dashboard**

Paint it Black [Inbox \(4\)](#) [Settings](#) [Help](#) [Logout](#)

Julian Knowles

Overview **Charts** Journal Groups Friends Neighbours Events Tags

Julian Knowles's Radio (show all 4 stations)

[Play my Radio Station](#) (Radio based on your music taste) [Share your personal station](#)

Recent Journals

Genius 9 Apr 2007

Brisbane - one of the world's top 5 hotspots for music 16 Feb 2007, 1 comment

Reviews of new Social Interiors release 19 Jan 2007

[Write a new Journal Entry](#) | [See more journal entries...](#) | [Feed](#)

Weekly Top Artists

1	Dirty on Purpose	10
1	Taylor Deupree & Christopher Willits	10
3	Lou Barlow	6
4	Laurie Anderson	6
4	Taylor Deupree	6
6	Eluvium	5
6	Belong	5

Recent Visitors

No one has visited your profile recently.

Julian Knowles's Shoutbox

Post to shoutbox

pinstripedrebel said:
I love EAWSI It doesn't show up on last.fm when I listen to you guys though 'coz I have most of your stuff on vinyl. Some of which I'll be playing at a club this coming Friday.:D
14 days ago

aliasfreq said:
yo!
42 days ago

JyotiMishra said:
Indeed! I have become obsessed with 'Dog Problems - it's such a POP album! Reminds me a bit of another POP album from years ago... :-)
in March 2007

Julian Knowles
Subscriber
Male, 6, Australia
Registered: 10 Feb 2006
Tracks played: 4,932
Posts: 44 (view history)
Journals: 13
[[ambient laptop meets indie]]
[Social Interiors](#)
[Even as We Speak](#)
[Julian Knowles and Donna Hewitt](#)
[[and other such non-sequiturs...]]
[Edit my details](#)
[Build a playlist](#)
Label: [Julian Knowles](#)
[Open label control panel](#)

Figure 3. Last.fm – excerpt from user profile page (Source: <http://www.last.fm>)


As a user's listening profile develops, they are joined by 'neighbours' - other users with musical tastes most closely matched to theirs. The example below in Figure 4 shows a partial list of neighbours, who have formed a 'neighbourhood' around the user. Note that demographic and 'last track played' can be displayed along with an avatar.

These people have similar music taste to you

[Play my Neighbourhood](#)
[Play in pop up](#)


[show images](#) [show details](#)

nydesolation




mike chaulk
Male, 18, Canada
Last track played:
[Grails - Burning Off Impurities](#)

vaseofkarma




Last track played:
[Destroyer - 3000 Flowers](#)

tetmonster




Marcus
Male, Sweden
Last track played:
[July Skies - East Anglian Skies](#)

frank_hurst




Jared
Male, 24, United States
Last track played:
[Bloc Party - Skeleton \(7" Version\)](#)

abaigalmags



abbe carson
Female, 19, United States

DevilCreep



Tommy
Male, 34, United States

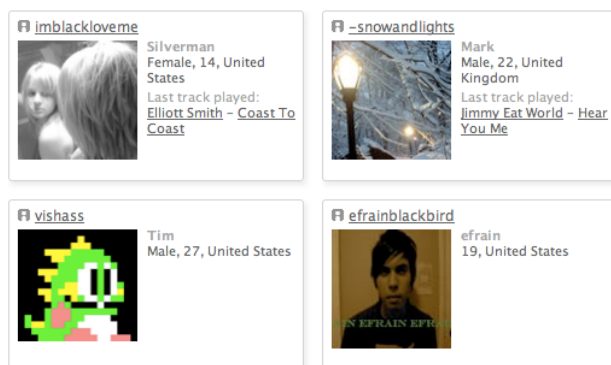


Figure 4. Last.fm profile ‘neighbours’ (Source: <http://www.last.fm>)

In addition to accumulating neighbours, a user may manually add any other user as a ‘friend’ (regardless of musical tastes), which creates a hyperlink and facilitates one-to-one communication. A user can view the listening activities of their neighbours and friends (in single or aggregated ‘dashboard’ views) and communicate with them via text comments and ‘shoutboxes’. This allows the user to customise their friends alongside their auto-generated neighbours.

The next layer of interaction is the ‘group’ and any user can form or join an existing group (in a similar fashion to a yahoo group). Groups are formed around people’s interests in an artist, micro-genre or around location, age group, political orientation, or any other criterion which may be the basis for people to interact. Once a group has been formed, the listening activities of its members are aggregated to form ‘group charts’ which are updated weekly to reflect the combined listening activity of the group.

In addition to building profiles of users listening habits from music held locally on their computers, Last.fm itself has a large library of mp3 content that can be streamed or downloaded if the copyright holder has granted permission. Each user or group has a ‘radio station’, which broadcasts his or her preferred tracks and artists. On the basis of a user’s musical tastes, they can also listen to a personalised ‘recommendation station’, which streams music recommendations informed by the user’s listening profile. Finally a user can create a radio station based on a tag, which plays items carrying that tag from the music database (see Figure 5). By triangulating a user’s musical tastes with the tagged library, there is a high probability that the radio station will play tracks known and liked by the listener, and in the event the material is new to the listener, it will carry similar features to music for which the listener has already shown a preference.

Start Listening to Last.fm Radio

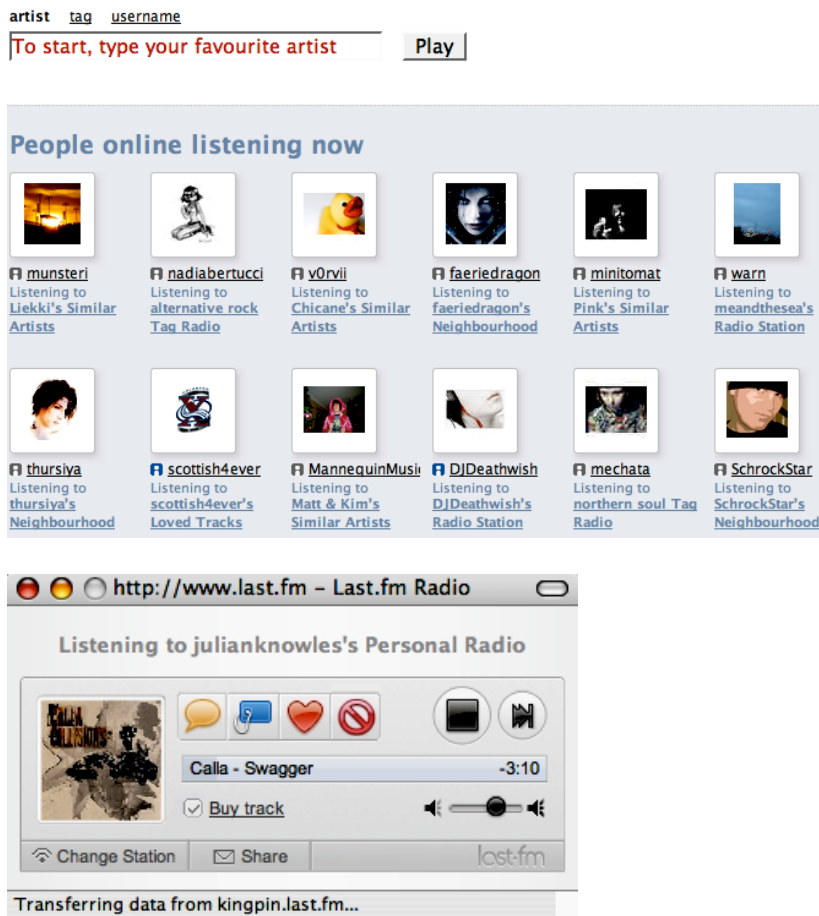


Figure 5. Radio stations on Last.fm (source <http://www.last.fm>)

Beyond the social networking aspects of Last.fm, aimed at bringing users together, a user can simply tag content with keyword descriptors as a way of contributing to the community. This can happen at the track level and at the artist level. Tags accumulate to become tag clouds (see Figure 2) and each tag in a cloud is an active link to other items that contain that tag. This allows the user to navigate their way through the huge database of music, by following tags that relate to genre, style, culture, period or any other relevant aspect that can be represented via a tag.

Last.fm is open to producers of music, who can upload and tag their content within the Last.fm system, a feature that distinguishes it from other music listener networking and recommendation sites. The producer is able to precisely specify the artist similarity through percentage weightings, which will in turn, affect the handling of that material in the recommendation system. For the music producer, this capacity to upload and 'steer' content (via artist similarity) within these networks is a major new development and is providing a new method of directly reaching audiences.

6. Web 2.0 music sites: Pandora.com

Whereas Last.fm presents a multi-faceted and comprehensive social networking platform, Pandora.com is less featured and focuses on the task of music recommendations to a single user via a streaming 'radio' service akin to a personalised internet radio station that, over time, is able to learn a user's tastes through a training process.

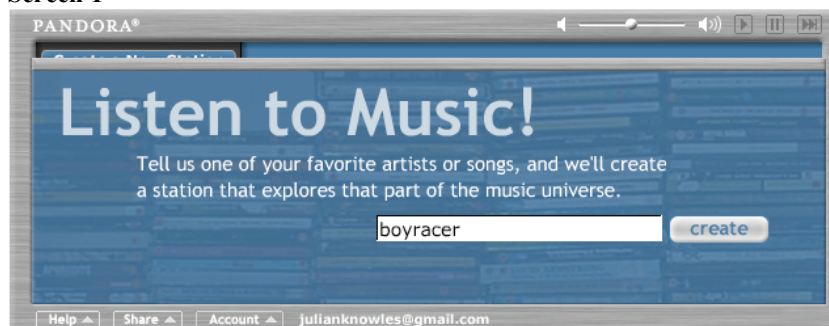
Pandora.com represents a different approach to the problem of providing an online music recommendation system. Rather than harnessing the wisdom of open crowds and relying on mass participation to sharpen the accuracy of the system, Pandora's music database is built and tagged by a group of music experts - up to 45 at any one time (Shane, 2007). Pandora is part of a larger project called the *Music Genome Project*, which is a project that seeks to identify the core traits and attributes that form the building blocks of music and then to map out musical items within this framework. The objective is for genre to be a less important organising principle than the basic music features which underpin it.

Think of a musical attribute to be the equivalent of a gene...human DNA consists of only four nucleotides and less than 40,000 genes, yet look at the overwhelming variety of music and human beings in the world. It's all about assembly, recombination, and probability. The basic components of a song are comprised of melody, harmony, rhythm, form, instrumentation, orchestration, the arrangement, lyrics, and vocals...Voice for example is broken down into about 30 attributes that describe range, timbre vocalization, and breathiness and each song is assigned up to 400 attributes overall (Shane, 2007).

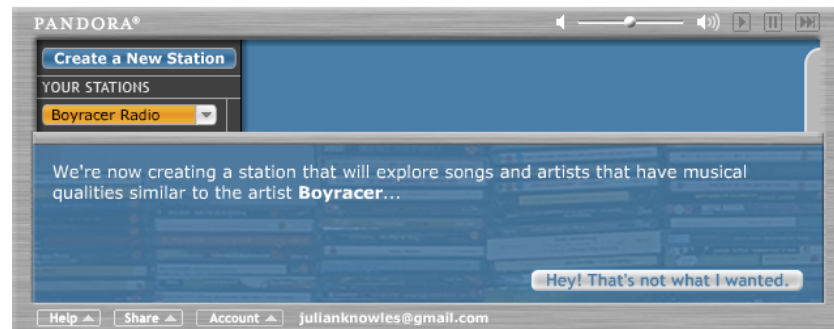
The key difference in the tagging systems for Last.fm and Pandora.com are that Pandora's tags are attributed by 'experts' from a 'controlled vocabulary' of 400 tags, that is, a standard library of tags, which, for commercial reasons, are not made visible to the end user. Clearly Pandora operates on the assumption that 45 experts can tag more accurately from a controlled vocabulary than a crowd of several thousand non-experts tagging in an unsupervised fashion, free from the constraints of a standard and finite list of tags.

The following figure contains a set of screen shots that show the user interface in Pandora, where a user creates a new 'station'.

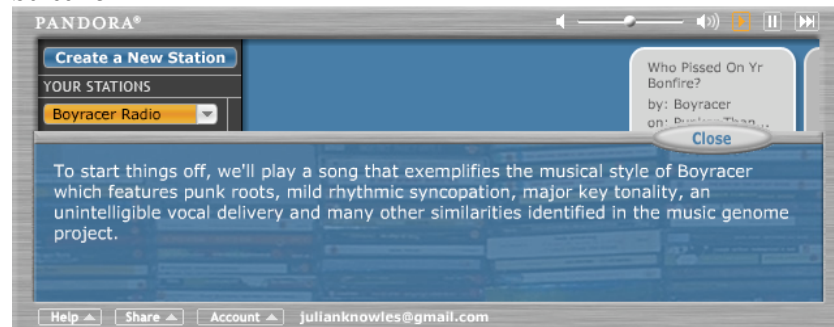
Screen 1



Screen 2



Screen 3



Screen 4

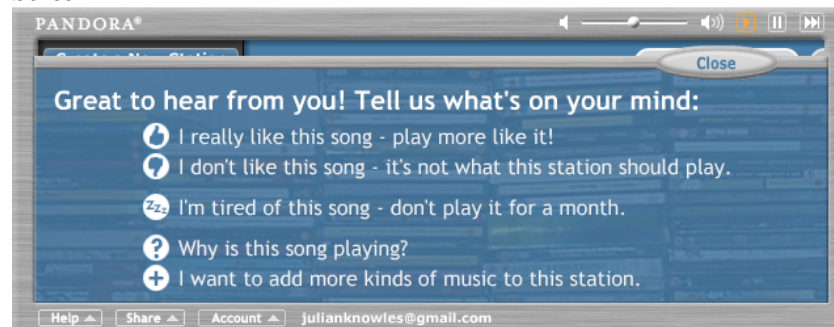


Figure 6. Pandora.com user experience (Source <http://www.pandora.com/>)

From the screen snapshots, we can see that the user begins by typing the lesser-known band name 'Boyracer' into the text entry field. The system brings a Boyracer track up for play and reveals some of the tags that describe its musical attributes in the Pandora database (eg punk roots, mild rhythmic syncopation, major key, unintelligible vocal delivery etc.). Note Screen 3 informs the user that the song carries tags containing "many other similarities identified in the music genome project". In other words, the user is told that there are many other tags guiding the process, but they are not revealed to the user, as they are part of the proprietary controlled vocabulary of tags employed by Pandora's music experts. This represents a very different approach to the open nature of Last.fm, in that the attributes and tags that underpin the recommendations are not made visible to the end user and the end user cannot contribute to the tag library.

Like Last.fm, however, Pandora mines the input of the end users to add to and refine the database, making the recommendations more accurate over time. Screen 4 above shows a simple training interface to allow the user to influence the recommendation system for more satisfactory, or personally tailored, outcomes. Whilst this training interface improves the individual user experience, it is understood that it is used to refine the

recommendation database for all users. Like many Web 2.0 services, it becomes more intelligent over time and as both the user base and dataset grows.

Importantly, Pandora does not provide a method for users to upload new material and relies on commercially published CDs for content. In this sense, Pandora is highly regulated and curated database and represents a markedly different model to open wiki approach of Last.fm. Arguably, the only aspects which the services have in common, is their aim to provide music recommendations to listeners and the capacity to mine user input to make the database more comprehensive and 'intelligent'.

7. Initial implications for music research and creative practice and areas for further investigation

Today's music researcher now has a different set of problems to confront than their counterparts 15 years ago. Now there is a massive array of content and ideas available online, the problem becomes how to filter content in meaningful ways, as part of the research and knowledge production processes. Previously, the challenge was to find and aggregate relevant and often-scarce content in physically distributed locations such as libraries. Now, the emphasis is on an individual's capacity to filter and sort large clusters of information and data in electronic spaces. Web 2.0 sites can provide some important tools for this.

It is critical to note that one of the major drivers of music-based social networking activity is illegal file sharing on peer-to-peer networks. The assumption is that p2p networks provide a free library of music via which one can pursue, and contribute to, the recommendations in social networking sites. Not only do p2p networks represent a major contributor to the musical literacy of the user-base, they also represent a major opportunity for exposure for lesser-known artists. The somewhat controversial conclusion is that illegal file sharing on p2p networks has formed an integral part of the education of many serious music listeners and this massive knowledge of music is now exchanged and aggregated via music social networking services. Interestingly, in acknowledgment of this clear shift, some of the major record labels (Warner Music, EMI) are providing streamed copies of their entire catalogues through social networking services, no doubt as a way of allowing users to hear good quality versions of recommendations without having to download illegal mp3 copies via p2p networks (Holton, 2007) ("EMI Music agrees content deal with Last.fm," 2007). From the perspective of a teaching institution, operating as they do within the constraints imposed by existing copyright law, the conundrum is how to acknowledge this undeniable reality, but not be seen to be promoting it. It would seem likely that new approaches to copyright may become necessary in light of the now huge gulf that exists between copyright law and everyday music listening practices in social media networks.

A further implication for music institutions is that today's music producer needs to understand the operation of Web 2.0 social networks and the ways in which producers can become connected to audiences and markets via such systems. The traditional model of the CD, manufactured and marketed via traditional means has been substantially weakened and it is clear that the core business models that underpin the music industry are in a process of large-scale transformation. Web 2.0 networks are now

sophisticated databases with intelligent search and recommendation technologies. The new music producer needs to understand how recommendation systems are seeded, and how to position content in large systems so that those who may be interested in the material can locate it.

Web 2.0 social networks bring together individuals who share interests in emerging and niche areas of the long tail in a rich dialogue and information exchange. In music, the collective knowledge outputs of these networks can now be stored, tagged and represented via sophisticated online databases and repositories such as Last.fm. The sharing of knowledge by expert peer users through online networks is now having a substantial impact on our understanding of areas which have previously received little attention (and for which no print material exists) and has facilitated the rapid building of tagged, folksonomic databases which are starting to form an extensive and fine-grained map of musical practice. The data within such databases can now be mined or visualised in different ways to help gain understandings of the relationships and connections between various musical genres and works. Music networking sites such as Last.fm demonstrate this potential, as do more generic network visualisation tools such as Touchgraph (<http://www.touchgraph.com>), which allows users to visualise links between related keywords and networks items mined from online databases and search engines. These tools are now becoming major drivers of listeners' understandings of, and tastes within, the field of music. The tools mediate the way in which a user understands the field of musical practice and the inter-relationships between various artists and genres. Web 2.0 services and social media networks now need to become core tools for expanding music literacies in a learning environment.

According to Tony Hey, Vice President of Technical Computing for Microsoft Corporation, among the science disciplines such sharing of resources and data in online databases is having a massive and unprecedented impact on the research productivity of the scientific research community (Hey, 2007). Hey argues that Web 2.0 and online networks have brought a velocity to the scientific research effort. In this community, Web 2.0 networks are already fundamentally shifting peer review practices through such projects as the *Faculty of 1000* project, an online publication repository that allows for large scale commenting and peer review ("Faculty of 1000," 2007). Clearly the academic scientific community is already embracing the wisdom of crowds, albeit through extended expert peer networks in the above example. Put simply, experts are now competing with the combined wisdom of crowds and the latter now constitute a more formidable force than had previously been anticipated. Given the debate around the effectiveness of traditional peer review processes (McCook, 2006), and a weakening of the authority and dominance of the individual academically-endorsed expert, it seems only a matter of time before peer review is opened up to as more extensive online review space in other disciplines.

Large scale, collaborative knowledge production, arising from collective and distributed authorship has become a significant force in the field of music. Initial research indicates that intensely collaborative knowledge production can clearly become 'near expert' in quality, sometimes equalling or even surpassing the quality of peer reviewed content, but that the accuracy of information is highly variable in open-access networked space and the authority of knowledge still needs to be tested from a thorough examination of independent sources. This challenges and presents an alternative to the

traditional model of the single expert or small group of expert contributing authors. From an anecdotal, end-user point of view, what is of interest is that the recommendations from expert services such as Pandora do not appear dramatically better than the recommendations from wisdom of crowds services like Last.fm. This might suggest that the wisdom of crowds is a rival to the wisdom of the small expert group. A quantitative study is needed here to provide a better comparison between the two approaches to assess the relative performance of the wisdom of the expert against the wisdom of crowds and the performance of a controlled vocabulary against an open tag, folksonomic system.

Large-scale Web 2.0 sites now offer an unprecedented opportunity to research current and emerging developments in all aspects of musical practice. The immediacy of online publishing, combined with the velocity of growth inherent in the knowledge repositories built by crowds, means that current musical developments can be researched in some depth, provided that one has the appropriate skills in search tools and can establish the authority of the source of information via the traditional methods of cross-referencing in multiple sources together with an examination of the primary sources where possible. The caveat is that the wisdom of crowds is variable in direct proportion to the number of authors and that experience suggests that niche areas in knowledge databases are less authoritative than more mainstream areas. An understanding of this dynamic can be seen as a necessary core attribute of the new music researcher.

For the academic community, the above developments raise some fundamental challenges around the need to update core research skills and teaching paradigms within the context of a sophisticated, and unfiltered, knowledge network and to learn how to best take advantage of social networking and social media technologies. The potential for defining new methodologies, which leverage the wisdom of crowds in a variety of ways, has already started to be explored. This is evidenced by the number of authors undertaking book projects using project blog sites as a platform for interaction with target readers during the writing process. For the music producer, a critical and practical understanding of Web 2.0, social networking sites, social media sites and p2p file sharing networks is essential in order to understand the condition and operation of the global music industry.

8. Epilogue

Since this paper was submitted for review, two major developments have taken place in respect of Last.fm and Pandora. On 2nd May 2007, Pandora founder, Tim Westergren, sent an email to all Pandora users outside the USA, informing them that

Due to international licensing constraints, we are deeply, deeply sorry to say that we must begin proactively preventing access to Pandora's streaming service for most countries outside of the U.S...Delivery of Pandora is based on proper licensing from the people who created the music - we have always believed in honoring the guidelines as determined by legislators and regulators, artists and songwriters, and the labels and publishers they work with. In the U.S. there is a federal statute that provides this license for all the music streamed on Pandora. Unfortunately,

there is no equivalent license outside the U.S. and there is no global licensing organization to enable us to legitimately offer Pandora around the world (Westergren, 2007).

It can therefore be seen that the regulatory frameworks for broadcast licensing (and their failure to cope with global services) have become inoperable for services such as Pandora. Whilst an expert internet user can still gain access to Pandora through US proxy services (albeit possibly illegally), it is effectively blocked for users outside the USA and the project has been somewhat stalled until international regulatory and legal frameworks can adapt to the new global internet economy.

The second major development concerns Last.fm. On May 30, it was announced the major global media corporation, CBS, had successfully acquired Last.fm for \$US280 million, issuing a statement that the purchase was part of its effort to “attract younger viewers and transform it from a content company to an audience company” (“CBS snaps up Last.fm for \$280m,” 2007). Aside from being yet another in a series of spectacular large scale social media acquisitions (following MySpace and YouTube), CBS are clearly confirming the operation of the music industry as a demand/consumer driven model – “an audience company” rather than a supply driven model and have made the paradigm shift, positioning themselves ahead of their competitors in an attempt to define a new business model around the participation and sharing evident in Web 2.0 and social media networks.

The argument that this paper makes, that Web 2.0 developments constitute a major paradigm shift in the global music industry and by extension teaching and research domains, is thus being evidenced at a considerable and consistent rate, underlining the need to radically re-evaluate approaches to the training of musicians and the conduct of research in the music discipline.

Web 2.0 music websites

Last.fm <http://www.last.fm.com>
Pandora <http://www.pandora.com>
MySpace <http://www.myspace.com>

Other Web 2.0 websites

YouTube <http://www.youtube.com>
Flickr <http://www.flickr.com>
del.icio.us <http://del.icio.us/>
Touchgraph <http://www.touchgraph.com>
Google Earth <http://earth.google.com/>

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Biography

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