UNDERSTANDING USERS OF COMMERCIAL MUSIC SERVICES THROUGH PERSONAS: DESIGN IMPLICATIONS

Jin Ha Lee
University of Washington
`jinhalee@uw.edu`

Rachel Price
University of Washington
`rachelpr@uw.edu`

ABSTRACT

Most of the previous literature on music users' needs, habits, and interactions with music information retrieval (MIR) systems focuses on investigating user groups of particular demographics or testing the usability of specific interfaces/systems. In order to improve our understanding of how users' personalities and characteristics affect their needs and interactions with MIR systems, we conducted a qualitative user study across multiple commercial music services, utilizing interviews and think-aloud sessions. Based on the empirical user data, we have developed seven personas. These personas offer a deeper understanding of the different types of MIR system users and the relative importance of various design implications for each user type. Implications for system design include a renegotiation of our understanding of desired user engagement, especially with the habit of context-switching, designing systems for specialized uses, and addressing user concerns around privacy, transparency, and control.

1. INTRODUCTION

Designing music information retrieval (MIR) systems such as music recommenders or music management systems is challenging due to the wide variety of organizational and listening strategies of music users [3]. Although the number of studies on music users, specifically related to their needs and interactions with MIR systems, has been increasing since the early 2000s [15], our understanding on how to understand and model these users for system design is still lacking.

Previous studies of MIR system users tend to focus on investigating needs, perceptions, and opinions of general users (represented by subjects recruited online or in academic settings) or specific user groups. Studies involving specific user groups tend to investigate users based on particular demographic information or users of particular MIR systems. However, few studies attempt to categorize the "personalities" of music listeners surrounding their interaction behavior on multiple MIR systems. In addition to demographic information, what kinds of personal characteristics can we use to model commercial MIR system users for system design? Our study aims to fill this gap in prior research and answer the following questions:

RQ1. What kinds of user personas can we identify from real users of commercial MIR systems?

RQ2. What are the expressed needs and behavior of each of these user personas, and what are the implications for system design for each persona?

Our research will contribute by providing a framework for understanding users of MIR systems based on their needs and interaction behavior, beyond typical demographic information. This will help inform system designers to develop systems that are better targeted for their user groups representing particular personas, rather than creating a "one size fits all" mass production model.

2. RELEVANT WORK

2.1 HCI Studies Related to Music

A number of studies in the human computer interaction (HCI) domain explore different user behavior related to music discovery or sharing. Most of the literature focuses on testing the usability of a particular system interface, or investigating user behavior related to music discovery or sharing within a particular application.

The literature reflects a growing understanding that current music listening habits are changing. Voong & Beale [26] highlight the fact that playlist generation is done differently now than in the past, whether users create playlists by mood, theme, or other criteria. In our research, we aim to understand these criteria that are relevant to users when generating playlists and judging the playlists created by music services, and how to use those criteria to influence user experience (UX) design.

The social aspect of music consumption also seems to be a key area for investigation. Research around social playlists illustrates how friends can learn more about each other and can strengthen relationships through understanding the preferences of others ([18][21]). Bonhard et al. [4] further illustrate that "friends from whom we seek recommendations are not just a source of information for us: we know their tastes, views and they provide not only recommendations, but also justification and explanations for them. (p. 1064)" The impact of new online music repositories to people's music discovery and sharing has also been discussed in [18].

Some studies looked at the problem of how personality affects recommenders. Researchers have borrowed theories from psychology literature about personality, as in [6], exploring the impact of personality values on users' needs for recommendation diversity. Their preliminary research shows a causal relationship between personality attributes, including openness, conscientiousness, extroversion, agreeableness, and neuroticism, and users' diversity preferences when using a recommender system. In our work, we take a more empirical approach, looking at

user data to understand various types of personas present in music services users and how the user experience can be designed to better accommodate these personas.

2.2 User Studies in MIR

Prior studies of MIR system users can be categorized into: 1) empirical investigation of music information needs, behavior, perceptions, and opinions of humans, 2) experiments, usability testing, interface design involving humans focusing on a particular MIR system, and 3) analysis of user-generated data such as queries or tags [15].

Of the first category, a few studies focus on "general music users," often represented by queries in search engines, or human subjects recruited on various websites or a game (e.g., [8][17]). A majority of them, however, focus on a particular group of users based on demographic information. Several researchers have investigated the effects of age (e.g., young adults in [14][27]) and nationality [10][12][23]. These studies revealed that age group and cultural background do affect how people perceive, use, and search for music. A number of studies also research needs and behaviors of users in specific music-related professions (e.g., musicologists [2], DJs [20], film-makers [9]). In order to complement the findings from these studies, we look beyond demographic information and model users based on their goals/behavior within MIR systems.

A few studies focused on investigating users' experiences with existing commercial music services, and thus are more closely related to the current paper. Barrington et al. [1] and Lamere [13] evaluated the quality of provided music recommendations or system-generated playlists. Barrington et al. [1] compare Apple iTunes' Genius to two canonical music recommender systems: one based on artist similarity, and the other on acoustic similarity. They demonstrate the strength of collaborative filtering combined with musical cues for similarity (similar artists and other display metadata) and discuss factors that influence playlist evaluation, such as familiarity, popularity, transparency, and perceived expertise of the system. Lamere [13] also compares the playlists generated from Google's Instant Mix, Apple iTunes, and the Echo Nest Playlist engine, and notes how personal preference of music or the context of music can affect the user experience with music services. Some factors that influence users' evaluations of playlist (e.g., familiarity, popularity, transparency) as well as the overall perception of the quality of music service (e.g., inexpensiveness, convenience, customizability) were also identified in [1] and [17], respectively. Celma [5] discusses varied recommendation needs for four different types of listeners (i.e., savants, enthusiasts, casuals, indifferents) based on their degrees of interest in music. Lee & Price [16] also evaluated commercial music services based on Nielsen's ten usability heuristics, advocating for more holistic evaluation of MIR systems.

Some studies focused on investigating the factors that impact people's music listening or sharing behavior. Baur et al. [3] analyzed a sample of 310 music listening histories collected from Last.fm and 48 variables describing user and music characteristics. They found that temporal aspects such as seasons and the degree of users' interests in novelty were important factors affecting people's music listening behaviors. Additionally, a number of patterns regarding users' music seeking and consumption behavior were observed in a large-scale survey [17]: an increased consumption in mobile streaming services, an increased desire for serendipitous music discovery and music videos, as well as a strong desire to customize and personalize their music experiences.

The scope and approach of our work differ from these studies on user experience with music services in that we investigate users of ten different MIR systems (Spotify, Pandora, YouTube, Songza, SoundCloud, Grooveshark, Bandcamp, Rdio, Last.fm, iTunes), and we take a qualitative approach, asking questions and observing users' interactions with MIR systems. Our work aims to build upon these studies and provide more detailed information about how user contexts or characteristics affect actual usage of music services.

3. RESEARCH DESIGN AND METHODS

Table 1 provides an overview of the methods and activities used for different phases for this study. The user data were collected through interviews and think-aloud sessions. All recruited participants were over 18 years old, and actively use at least one music service/application. All participants were undergraduate or graduate students at University of Washington. All the interviews were conducted between January and March 2014, either in-person or via Adobe Connect video conferencing. A total of 40 participants were interviewed and compensated with a $15 Amazon gift card.

Methods	Activities
User interview	Semi-structured interview asking about how participants use music services and how they evaluate the quality of the services.
Think-aloud sessions	Participants narrate their actions out loud as they use their preferred music service as they would in a typical session.
Card sorting	Identify task-based user segments and create personas for each segment.

Table 1. Overview of the study design

The study session consists of two parts: first, subjects were interviewed about their preferred music services, discussing their interactions with the service, how they navigate the system, why they prefer one service over others, frustrations they experience with the service, and how they interact with the service in a typical session.

Secondly, participants were asked to "think-aloud" or narrate their actions out loud to an investigator as they use their preferred music service in a typical session. These tasks include known-item search, browsing albums, artists, or genres, interacting with recommendations, playlists, and radio stations, and other tasks as they arose. Each study session, consisting of the interview and think-aloud, lasted for approximately an hour.

The user data was used to generate a list of behaviors exhibited around MIR systems. A card sorting activity

was used to identify user groups with similar behaviors as a basis for deriving useful personas. Personas are "hypothetical archetypes of actual users (p.124)" representing their needs, behavior, and goals which allows for a goal-directed design of a system [7]. Persona development has been used to aid design and gain user insights across many fields [22], and can be beneficial for prioritizing audiences' and users' goals in product development [24].

We created a comprehensive list of user activities from the interview transcripts and think-aloud activities as well as the notes taken during observation. A total of 77 user behaviors related to music services were identified (e.g., read reviews, judge others' tastes, seek recommendations). Through a card sorting activity, similar behaviors were grouped, organized, and named. We then attempted to identify which types of users would show these kinds of behaviors and tentatively named these user groups (e.g., genre fans, tech savvy). Afterwards, we identified two relevant dimensions to express the differences among these user groups organized by their common behavior, or "task-based audience segments" [28]: Companionship (willingness to engage in social aspects of music recommendation and listening: social - neutral - private) and Investment (willingness to invest time/effort to interact with the system: positive - neutral - none). As a result, we derived these seven personas:

- Active Curator: Neutral companionship + Positive investment
- Music Epicurean: Social + Positive investment
- Guided Listener: Neutral companionship + No investment
- Music Recluse: Private + Neutral investment
- Wanderer: Neutral companionship + Neutral investment
- Addict: Private + No investment
- Non-believer: Social + Neutral investment

Any user may exhibit a combination of these personas as they are not mutually exclusive. Each of these personas is explained in detail in the following section.

4. USER PERSONAS

4.1 Active Curator

This persona takes great pride in their music listening, and enjoys seeking new music and curating music he/she is already familiar with. This may come in the form of playlist creation, "saving" albums in online collections, or light music "research", such as previewing songs or taking recommendations from friends, blogs, and live shows. Of all the personas, this one is the most actively engaged with music services ("I'm definitely an active listener 98% of the time." (P21)).

This persona tends to utilize known-item search alongside other discovery tools, often searching rather than browsing ("I [search for song or artist] at least once a day." (P26)). An active curator may often find discovery tools to be disappointing ("I feel like I end up listening to stuff I already know. It's a little frustrating" (P1)). They tend to have higher expectations for music recommenda-

tion services and may not always trust a service to make good recommendations.

*"One of the reasons I use these services is because **I'm looking for linkages from music to music to music…I'm a little bit pedantic...**In fact, I would **love to have a little bit more information** [about recommendations]." (P1)*

*"**I would love to see the metadata that goes into choosing each song**...[I'd love to] **be able to pick and choose those attributes, so I could say, 'ok, I do like those smooth jazz elements, but I don't like the saxophone solos.'"** (P30)*

4.2 Music Epicurean

This persona may be considered a "music snob." Music epicureans take an immense amount of pride in the music they collect and listen to, although they may not necessarily own all that music. Although streaming music is still an acceptable form of listening, this persona is more inclined to purchase music after listening to it than other personas as he/she genuinely cares about sound quality. A great amount of time is spent "hunting" for new music. This persona tends to focus on relationships between bands that may not be typically identified by a music recommender, such as similar "scene", overlapping band members, and a nuanced understanding of genre relationships, and thus expresses dissatisfaction towards the given recommendations ("It looks like it's only making recommendations of artists based on artists." (P23)).

The music epicurean persona is unlikely to use music system recommendations; users representing this persona tend to also represent "The Non-believer" persona described below. The Music Epicurean leans on trusted sources for recommendations, whether it is a small group of friends with trusted taste or other "vetted" sources.

*"**I'm very self-directed in listening to music**. When I listen to the radio, it's KEXP, and it's usually a really short amount of time in the morning. **I know what I want to listen to, why am I just going to let a random radio station tell me?**" (P8)*

*"For me it's not really worth the time. I think it's just going to recommend stuff that's also tagged [similarly]...**I do my own ways of [finding], and I rely on my friends and people I write with to recommend stuff**..." (P6)*

4.3 Guided Listener

The Guided Listener's most prominent quality is the desire to hand over control of the music to someone else. This persona mildly enjoys radio's serendipitous nature, may have slight preferences over genre or artist, but ultimately just wants to hear something playing. This persona is not picky; he/she may occasionally interact with a service to indicate preferences or dislikes but will not go out of his/her way to curate albums or playlists.

This persona may provide "seed" songs or artists to help a system generate a playlist or radio station, and infrequently, will browse new music or artists for fun or out of boredom. For the most part, the guided listener is a "set it and forget it" kind of person.

"It's definitely 'log in', get to where I'm going, and it even goes back to the default station that I was listening to before.

I mean, I can get this thing booted up and going within seconds, and then I'm off doing dishes or whatever, which contributes to my satisfaction. It's going to do what I want it to do immediately. Boom. Off I go." (P17)

4.4 Music Recluse

The primary characteristic of the Music Recluse is that he/she is a very private listener; this persona does not need to discuss his/her music listening habits with many people, and guards his/her privacy when using a music recommendation service. The music recluse actively avoids the social functions of music services like Spotify or Pandora and considers listening to be very personal.

This persona may have sporadic listening habits, may listen to music he/she is not proud of or would not want others to know about. Music recluses do not want people making assumptions about them based on the music they listen to.

"I would allow zero information. I already think YouTube is too invasive. They're already forcing users to create Google Plus accounts to comment on videos." (P25)

"I turned off sharing functionality. I made sure that I wasn't putting it up on Facebook or sharing it...I definitely listen to a lot of embarrassing stuff and I don't want everybody to know that. And I'm not really part of musical communities or anything, so I don't feel like scrolling through my friends' music gives me any useful information or songs to listen to." (P34)

4.5 Non-believer

The non-believer is a persona who does not believe that a machine can make adequate music recommendations for a variety of reasons: they do not understand how an algorithm can make "good" recommendations, they are able to see the limitations of recommendation algorithms, they prefer getting recommendations from friends, or they simply have not had good past experience with music recommendation services. Non-believers also have a tendency to dislike sharing personal information or listening histories with the service/system because they do not see the benefit of doing so. This persona often uses human-curated music services such as Songza or 8-Track, friends' playlists, or their own collections, which may or may not be heavily curated.

"Pandora will give me mainstream blues because it's similar rhythmically and in instrumentation, but that's not the vibe I'm looking for. It seems like they go off of something really mechanical. They're missing out on something and I don't know what it would be called, like context, and how the music makes me feel." (P23)

4.6 Wanderer

The Wanderer primarily enjoys serendipitous music discovery, and listens to new music with an open mind ("…when it recommends me things that I never would have thought of, so I think, 'yeah, I'll give it a shot'." (P11)). This persona enjoys the discovery process in general as a fun pastime, and is willing to put in some effort to discover new music. The wanderer will likely accept recommendations from a system as equally as she will accept them from a friend, a blog, or a stranger.

The wanderers tend to listen to music from a wider variety of music genres, although they may also have preferred favorites. They enjoy discovering music/artists that are less popular and are willing to listen to new artists or genres. Wanderers may like recommendations based on "playful" themes such as "Monday morning" or "Coffee music." They are more likely to use a variety of tools and also new features in the tools they regularly use.

"Honestly, the serendipity of finding new music is what I enjoy the most. Generally if I'm listening to new music it will be because a friend recommended it or I came across it on YouTube through NPR Tiny Desk or something like that. I prefer that model...I listen to pretty diverse things." (P13)

4.7 Addict

The Addict exemplifies a known-item searcher and strongly utilizes a service that features search. This persona may listen to the same song multiple times in a row, or for a whole week (e.g., "I sort of fixate." (P1)). This persona tends to use services like YouTube or Spotify where it is easy to repeat albums or songs. Their musical tastes may be all over the map, and they tend to listen to things on a whim, rather than curating any collections. They may listen sporadically, for short periods of time, and rely on easy access to music (web-based) from a variety of devices. The addict typically does not save his/her preferences by creating playlists for later access.

"I prefer Grooveshark...because I have a tendency to listen to a song, and then listen to it on repeat until I hate it forever, and Pandora doesn't let you do that at all, whereas in Grooveshark you can do that." (P23)

5. THEMES AND DESIGN IMPLICATIONS

5.1 Engagement, Ownership, and Specialization

Our user data suggest that we may need to rethink the concept of "engagement" and how that affects peoples' preferences for music services. If we consider engagement as users interacting with the system by exploring available features, then while it may be counter-intuitive, some users have no desire to engage with their preferred system. The way these users measure the success of the system is based on how little they have to interact with it.

"As soon as I figured out the basics...as soon as I found that I could look at some friends' playlists, and that I could find a few artists and make a radio station, I just, I was like, I'm done. I'm done learning how to make this work." (P1)

"There's nothing I don't like about Pandora...It might just be because I'm content enough...And I think I'm old enough, you know, I'm 45, I'm not into that 'music is my world' type of mentality. So it's not high on my list." (P17)

A strong satisficing theme was identified among these users, consistent with the finding in [16]. As long as the system does what it is "supposed to do", then it is "good enough" and users do not expect much more. This is especially exhibited by participants representing the "guided listener" persona, who tends to prefer music services like Pandora. The "addict" also tends to exhibit shallow engagement with the services. During the interview, it

became evident that most participants who can be categorized as guided listeners had never gone beyond the surface level of system. In fact, many participants discovered some of the features offered by their preferred service for the first time during the think-aloud sessions. They tend to have very specific needs and do not explore the service beyond their immediate needs.

Personas such as active curator and music epicurean showed higher levels of engagement with the systems and seemed to have a stronger sense of ownership over their music collections. Active curators in particular would spend much time curating playlists even though they do not technically "own" the music. While guided listeners would most likely be satisfied with a streaming or subscription-based model, active curators and music epicureans hesitate to abandon the collection-based model. For this reason, we expect that cloud-based music services will appeal more to the latter group of users. For them, providing a way of creating their own access points into their collection will become an important issue, as the size of their collection will continue to grow. Organizing and accessing their collection by play frequency, name of the person who recommended a track, release date, or user in households where multiple members share the music service, were some examples that respondents specifically mentioned as potentially useful.

In order to meet the needs of different personas, it may make sense to release different versions of the service/app so users can decide the appropriate version based on how much interaction they desire ("If [Spotify] had a light version then I would use that more. Like iTunes had a little mini-player, for example." (P13)). Based on general observation, it does seem like specialization works better than generalization; each service definitely tends to attract particular types of user personas. For example, Pandora tends to attract users who do not want to spend time and effort curating music collections or listening experiences. On the other hand, Spotify users tend to invest more time in organizing their collections and providing input to improve their listening experience. Although users also rely on Spotify for music recommendations, they tend to be more critical about the results due to higher expectations. Websites like YouTube also serve a specific purpose, which is to stream videos, rather than attempting to work as some sort of Web portal that offers a variety of services. Many users, especially with need for known-item searches, will go to YouTube. Users' strong desire to customize and personalize their music experiences was also noted in [17].

5.2 Awareness and Preserving User Trails

Another theme emerged around a user's general awareness within a system. Most users expressed a habit of "digging" and following "wormholes" while using mid- to high-level curation tools such as Spotify, Grooveshark, and YouTube. Many of these systems do a poor job of indicating the user's location within the site, or helping them retrace their steps, which often results in users feeling the sense of "being lost."

*"It's constant digging. Click, click, scroll...**wait, where am I? Click, scroll. For almost everything I want to do, I can never get there on the first try**, or even if I get there on the first try, it feels like an accomplishment. Most of the time, I have an idea of where I am, but **I don't always know how to get back to where I was.**" (P11)*

*"I feel like I'm not as adventurous in wormholing sometimes as I can be or want to be, because **I'm afraid of getting lost. If it were a little bit easier to just go back to where you started from or some sort of chain-of-command of what you had just done that you could click through (like a breadcrumb trail),** then I probably would feel a little bit more comfortable." (P3)*

This was also related to the general lack of error explanation in the systems, which would ideally help users recognize and prevent errors ("It just says, 'There was an error.' I almost never know what's going on when something goes wrong." (P11)).

Users who discussed digging, wormholes, and the like, tended to be those who actively engaged with the service. This may span across any persona, but there appears to be a correlation between concern for user trails and engaged personas like the active curator and the music epicurean. Ideally the system should support the expression and preservation of a user trail and use breadcrumb trails to give users locational clues.

Users also indicated that more transparency over recommendations would improve their likelihood of trusting the system. Not knowing why the system wants them to listen to a particular song made them less inclined to follow the recommendation, especially for the active curator, non-believer, and music epicurean personas.

*"**Sometimes I wonder why things are on there.** I guess I need more insight on why I should choose to click on this thing...if it's a band I've never heard of, **I'm not going to click on it unless there's a reason for me to**...A lot of times it's like, 'You listened to this song by Rihanna once. All of a sudden we think you should listen to Justin Bieber.' That doesn't work for me." (P31)*

5.3 Privacy Concerns

Several participants discussed privacy concerns around using music services. Our data suggest that the levels of privacy concerns are possibly affected by the following three factors: a) user's interest in/belief of a machine's ability to accurately recommend music, b) level of understanding of privacy issues, and c) overall tech savviness. A user who has a higher interest in/belief of a machine's ability, a better understanding of privacy issues, and is more tech savvy, tended to be more concerned about sharing their personal information. This trait was exhibited across personas regardless of music listening habits, and most dominantly in non-believers.

*"When you download the software, the automatic preference is that **Spotify will open every time you turn on your computer. I don't like that.** The first time I ever downloaded Spotify, that was the reason I didn't use it [right away]. **I felt like it was hijacking my computer.**" (P1)*

"I wouldn't want to give a system more information about me even if it would provide a perfect playlist, because I still

want to have control of that [information]...It's creepy...I **like having some degree of control and privacy.** *(P13)*

*"***I'm split between 'that's really cool' and 'that's kind of creepy'. If I had the option to control it then that might be something I accept.***" (P30)*

Being transparent about information collection and allowing more user control over privacy may help alleviate fears. This desire for control was also observed in [11], where users wanted to be in control of logging what they considered as the most private information. They found that "users prefer sharing some information automatically such as listening history, sharing some information at will and keeping some information private (p. 171)" [11]. This aligns with concerns that arose during our interviews about privacy of information or activities. While listeners may be willing to share listening history, either discretely or publicly, those same users may be concerned about other information being shared without their knowledge.

In addition to "what" is being shared, two other aspects worth noting are the different reaction to "who" is accessing users' personal information and the directionality in sharing information. There seemed to be a distinction between keeping private information from the system versus from other people. Users exhibiting the music recluse persona, for instance, were much more concerned with the latter aspect. Music epicureans seemed interested in sharing their music listening history in a limited social circle ("I talk to about five people who like the same music as me. I just feel weird about posting videos on Facebook like 'Listen to this'." (P31)). Also a number of users acted like "lurkers" in that they wanted to see what other people listen to but did not want to share their own listening habits with others.

During our work identifying the personas, we initially thought there may be a persona "Public broadcaster," someone who is very social and publicizes his or her listening choices. Careful examination of the transcripts, however, revealed that none of the users interviewed were "public broadcasters" themselves, but many made mention of that characteristic in friends or acquaintances who also use digital music services. Most of the comments alluding to the existence of this persona described how people have seen this kind of "broadcasting" behavior on social media (and were often annoyed by it). We believe that this persona may still exist, as previous research such as [11] found that their users were willing to share and seek shared information such as music listening habits, and some were already publicly doing so on websites such as Last.fm. Although users did want to keep some information private, music listening history was not such information. However, it may also be the case that we are simply seeing other's music listening history because of the default setting in some music services to publicly share such information, and as previously discussed, many users do not spend much time trying to master their service's feature settings. We plan to further explore this through a survey with a larger number of music service users.

5.4 Context-switching

In addition to the different personas, the user's context seemed critical in determining which services they use.

*"***It really depends.** If I'm upstairs* **in the office** *and coding data, I generally listen to* **music that I already know and like,** *because I don't want it to take my focus away. If I am taking my dog for* **a walk or going for a drive,** *I may* **use the recommendations just to listen to new songs.***" (P13)*

This resonates with previous MIR studies discussing how perceived qualities of music are affected by the context of the user [19], and how mood, activities, and social context among other factors influence music perception [25]. There were several aspects of user's context that seemed particularly relevant:

1) **Level of attention**: This was often dependent on other activities in which users were concurrently engaged (e.g., driving or working).

2) **Level of energy/motivation**: This is closely related to users' willingness to interact with the system. Generally, tech savvy music listeners were more willing to do so, but depending on the time of the day, this also seemed to change (e.g., acting passively while fatigued after work).

3) **Mood**: The user's mood constantly changes based on different events he/she is experiencing, and thus, the user may want to listen to songs with different "feels".

4) **Temporal aspect**: This can be seasonal or about the time of day. Depending on work schedules, the early morning or evening may be the best time for users to interact with a system. Seasonality also means that users are engaged in different activities or in seasonal moods.

User needs appear to continually shift depending on these contextual elements. A system allowing context-switching based on a combination of system logs of geo data, device usage, etc. (for attention level and temporal aspects) and users' input (for level of energy/motivation and mood) would be desirable.

6. CONCLUSION AND FUTURE WORK

In this paper, we present seven personas surrounding the use of commercial music information systems, derived from user interview data and observation of use sessions. These personas, each representing specific traits and attitudes of users, will be helpful in designing music information systems that are more highly tailored to specific user groups. Analyzing the user data made it clear that there is a relationship between persona placements on spectrums and types of services preferred. For instance, a user who is an active curator and music recluse would be more likely to use a "fringe" service such as Songza, whereas a guided listener user would likely end up relying on an online radio service like Pandora. Based on users' opinions and observations of their interactions with the services, we discussed several design implications.

In our future work, we plan to expand this study and test the applicability of these personas with a larger user population since they were derived from a relatively small sample. We will verify our results obtained from a qualitative approach by surveying a larger number of users to identify appropriate personas reflecting their characteristics, using a stratified user sample based on their most preferred commercial music service.

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