# Introduction

The digital age shook the pillars of the music industry, initiating an unprecedented revolution in the field. If in the past the creation, duplication and distribution of musical libraries was the exclusive purview of professionals, today any person with a basic knowledge of computers and an internet connection can do the same. A user can obtain, legally or otherwise, any musical item ever recorded. Likewise, he can do new things with them: he can store songs on his computer, he can organize them as he wishes, he can store them in a new collection, he can copy them as many times as he wants, and he can distribute them quickly to whomever he wishes.

The digital revolution changed the model of music consumption: it dispensed with the need to rely on the whims of traditional musical media (radio, television and the like) and created an additional and more advanced option for the consumption of music, one that no longer required the physical or digital possession of music items. Today, music can be consumed directly and at any time via digital streaming services. These services have at their disposal massive music collection databases, and generally operate online, allowing the user to listen to her music whenever she wishes (Cohen, 2010; Swanson, 2013).

Dozens of music streaming services exist, each one offering users its own unique qualities and functions. These are application services, mostly web-based, using a client-server model which allows a user to select music items on demand from a music database (Kreitz & Niemelä, 2010)

The advent of these services also influenced the personal information management of users. Personal information management is defined as “an activity in which a person organizes and saves information units in order to retrieve them at a later time” (Bergman, Beit-Marom & Nahmias, 2006, p. xxx). These items may be physical—documents, books, letters, etc.—or digital: files, favorites and digital folders. In terms of the management of music information, in the past a user classified his physical or digital collections according to criteria such as artist name, song name, music genre, etc. When it comes to streaming services, in which the user has no direct ownership/control of/over the items in his possession, new possibilities for the management of music consumed become possible.

In this study, we will examine the influence of streaming service use on the musical information management of users. We will conduct personal interviews with users of these services which will help us answer the research question: **is personal information management manifested in the use streaming services and if so, how?** We will explain the study further in the methodology section below. We will now provide a theoretical basis which will help the reader understand the topic at hand.

# Literature Review

Two scopes of literature will be discussed: first, we will provide a general overview of notable events in the process of music consumption; second, we will provide a detailed discussion of the streaming services relevant to this paper.

The technological development with the greatest influence on the global music industry was the invention of recording technology in 1877. For the first time, music consumers could save, transfer and replicate sounds produced elsewhere. Until the end of the nineteenth century, sound recording was primarily used for speech and rarely for music. Two major systems for sound recording had been invented: Thomas Edison’s phonograph, which could both record and play sound and Emil Berliner’s gramophone which used a record—a flat, round disc with a hole in its middle. The record allowed the mass production of sound recordings, and allowed music consumers to play music with household devices. With time, record technology underwent many improvements, allowing, among other things, better sound quality and longer recording times. However, recording was exclusively done in professional studios and the user at home could only listen to songs on a record in the order they had been recorded.

In the first half of the twentieth century, the tape recorder and audio cassette were invented. These two technologies allowed music to be recorded at home and facilitated the cheap and easy reproduction of musical content, in addition to allowing playback of a cassette’s contents. These innovative possibilities opened the door for the mass distribution of music content worldwide. The combination of these possibilities coupled with a lack of copyright oversight, inaugurated the age of pirated copying. Using an audiocassette—which allowed for easy fast-forwarding and rewinding—the user benefitted from a large degree of control over the order of her music playback. However, the listener still lacked direct control over the songs, unless she had produced the cassette herself (Malm, 1992).

1983 marked the beginning of the digital age of music with the invention of the compact disc (CD). The CD offered a more convenient listening experience, and a higher sound quality without precedent. It was also a far better storage system than its predecessors. However, its mechanics were still like those of an audio cassette. Its advantage lay in the ability to create personal music collections and to copy these with ease. Its greatest disadvantage, was the inability to control play order, even though one could skip or replay tracks (Malm, 1992; Swanson, 2013).

In none of the formats mentioned was there any real possibility for personal management of one’s musical collection. One could only organize pre-prepared collections—for example, by classifying according to artist, collection, genre etc. Likewise, besides the inability to control listening order, obstacles prevented a user from selecting a specific song which was not contained in an existing collection.

In the eighties and nineties of the previous century, the music industry thrived and was flooded with content. Artists made a fortune because the listener had no alternative—when she wanted to listen to a specific song she had to buy the album in which it was played. This all changed in the early nineties, with the advent of the computer revolution and the beginning of MP3 use. The digital revolution and the beginning of home internet use served as the background for MP3 use. Like all files, MP3 files could be sent via email or shared online. Likewise, files could be downloaded via dedicated service plans.

An example is Napster—a service which was based on peer-to-peer sharing. Napster was founded in 1999, and became one of the first services to allow the sharing and exchange of MP3 files on a large scale and for free. Following the establishment of such services, the user was afforded possibilities such as: unlimited access to musical items for free; a certain degree of ownership (albeit illegal) of the songs downloaded to his computer; and the ability to manage his personal music collection in a variety of ways, as much as a given operating system allowed. These modern possibilities inaugurated a substantial revolution in the music industry, especially the music business (Denegri-Knott & Tadajewski, 2010; Swanson, 2013).

In 2002, the possibilities of music consumption developed further, with the establishment of online music services based on media streaming technology. This technology allowed a user to play audio, video or multimedia files through the internet via a direct, simultaneous and real-time transfer. Streaming files could be used the moment their data was received and saved on the receiving station (for example, the service providing them). It became unnecessary to physically download the files onto the user’s computer and the songs left no hard copies. It is important to note that such services are careful to maintain the high technical quality of their contents.

There are, today, a number of different streaming services; we will focus on music services. These services were established as personal radios, expanding regular media channels. Instead of the user listening to a predetermined playlist chosen by a higher authority, these services allow the listener to choose himself how to manage and share content (Nguyen, Dejean & Moreau, 2014; Snelson, 2011).

We will now explain the shift in economic models initiated by the advent of streaming services. The literature divides listeners who illegally download music into two categories: “savers,” who maintain that the price of legal music is unfairly expensive, and “samplers” who use downloading to familiarize themselves with the music available in preparation for future, legal purchases. The sampling method has two advantages: it may possibly lead to a decline in illegal downloading activity and it may also prevent unsuccessful purchases (Dörr, Wagner, Hess & Benlian, 2013; Nguyen, et al., 2014).

The economic models of streaming services can be divided into two categories: Freemium—a free service based on advertising revenue; and a service based on a symbolic monthly payment which allows unlimited access to music—without advertisements and with a higher level of quality. These usually allow listening on one’s phone, even offline. The Freemium model is designed to encourage listeners to become paid subscribers in the future.

The consequences of this new model are ambiguous and contradictory: on the one hand, such services expose a user to a wider spectrum of artists, thus strengthening purchases; on the other hand, they will likely lead to a decline in album sales. Many artists, therefore, object to their usage. They argue that their sales are harmed and their royalties from the services insufficient. The service itself can partially help new artists publicize themselves and distribute their content over social media, though without royalties. However, listening through these services is better for the artists than illegal or free music consumption (Nguyen et al., 2014; Swanson, 2013).

We will now provide a detailed summary of the major streaming services mentioned in the interviews we conducted. The first is Rhapsody. This service, established in 2002, was the first to allow direct, legal, online music consumption on demand, using streaming technology. It was, however, a paid service.

The second is Pandora which was launched in 2005. Pandora took streaming services to the next level, providing a service which imitated the radio, allowing a user to listen to online radio stations created based on his preferences. The service’s system plays a song or artist picked by the user, or similar music, based on his music preferences. Songs are located based on pre-encoded data as well as the songs’ metadata. To save time, the service employed social media services and group encoding by different listeners (Casey et al., 2008; Swanson, 2013).

The third service, launched the same year, was YouTube which initiated an additional revolution—now, allowing the uploading and sharing of visual content accompanied by music and sound, including a large amount of musical content. Like its predecessors mentioned above, YouTube also allowed its users to consume musical content directly and on demand. In later iterations of the website, users could also build personal collections (a play list). The present study will focus less on this website (Snelson, 2011; Swanson, 2013).

The fourth service is Spotify, a Swedish service launched in 2008 with the goal of providing a product superior to its pirate equivalents. It works similarly to Apple’s downloading service iTunes. Searches are conducted using a search engine, according to song name, artist or album. The service includes more than 20 million songs and is constantly being updated with special programs for locating new songs. As of 2015, the service is not available in Israel (Dörr et al., 2013; Swanson, 2013).

Two other services mentioned in the study were TuneIn and SoundCloud. TuneIn is an American service which provides access to radio stations and podcasts from all over the world. SoundCloud is a sharing website providing users with special options such as the ability to upload one’s own tracks; posting comments on a song’s visual display as one listens to it; building a personal listening profile and the ability to follow favorite artists.

# Methodology

The main question we sought to clarify in this study was: **is personal information management manifested in the use streaming services and if so, how?** To analyze this question we conducted personal, frontal interviews with three users of streaming services, all of whom study in Bar Ilan University (see questionnaire in appendices). The primary questions used during the interviews to clarify the study’s main question mentioned above are presented below:

1. What are the user’s listening habits?
2. How did users retrieve songs before they began using a streaming service as opposed to afterwards?
3. How does the user add new songs to a streaming service?
4. Does the user feel that he or she is the owner of the songs accessed on the streaming service?
5. Can listening to music on a streaming service constitute a form of social activity? If so—how?

It goes without saying that the questionnaire used for the interviews contained pre-prepared questions (as mentioned). However, during interviews new questions were added based on the answers provided by the interviewees. In the following sections, we will present the findings from the interviews and our conclusions.

# Findings

In this section we will present an adapted version of the research findings. The full interviews can be found in the appendices section. We will begin with demographic information. Two men and one woman were interviewed. All three were unmarried, between the ages of 25–32, and native-born Israelis. The men live in cities in the country’s center (Tel-Aviv area), the woman—on a kibbutz in the north. Two have lived for a brief period of time in the United States. As explained in the methodology section, all three are students in Bar Ilan University: two in the third year of their undergrad studies; one a graduate student. All three work in subjects related to technology or music: computer science, content management, and a production and financial manager in a music center.

We will now discuss the main questions. The first question addressed users’ music listening habits, the use of streaming services and their reason for using these specifically. We will begin with music listening: two interviewees mentioned listening to albums, whether bought or downloaded to their computer. These same interviewees also mentioned that they listen to music on a music player or USB drive. All three, as required by the study, use streaming services. They mentioned that they use free services, though one interviewee mentioned using a paid service in the past. The third interviewee mentioned that he only uses streaming services and YouTube.

Regarding services used, it was found that all three used SoundCloud and at least two used YouTube and TuneIn. Additional services mentioned included: Pandora, Shazam, Tunemex, iMesh, Podcast, and Spotify—using an American access point, the interviewee having lived in the US for half a year. Some of the interviewees were asked how they arrived at these services. One said, through YouTube; the second through her partner who created a SoundCloud channel; the third, was not asked this question, though he did mention that he would have arrived at these services even if he had not previously lived in the US, due to their convenience.

The reasons for using these services were diverse: the wide selection of songs with different listening options; access to songs through personalized recommendations; convenience; and availability without advertisements (for certain services).

The second question was related to song retrieval before and after the users began using streaming services, and the changes to retrieval (if anything) afterwards. It was found that in the past the interviewees would retrieve songs in the following ways: two mentioned downloading; one mentioned purchasing albums and cassette tapes, adding that today he continues to do so primarily for collecting purposes and for playing in his car. Likewise, he explained the experience and habit of buying a new album “it’s become a habit, and I loved opening the wrapping and reading” (A.M.); another interviewee mentioned listening to cassettes and YouTube on the computer; one mentioned retrieving songs through various forums and via Google searches. She also mentioned that the TV Music channels, MTV and VH1, helped introduce her to songs. Finally, she received music news via the internet.

All mentioned that their retrieval methods have changed. Each interviewee interpreted this change differently and we therefore received diverse answers to this question. Changes mentioned included: searches using dedicated services, in accordance with provided options such as song name, artist or album; music recommendations provided by the services based on the users’ consumption habits; more general forms of retrieval of an artist or song through Google: “I use Google to search for lyrics, artist information and an artist’s page” (H.G.). One mentioned the physical aspect of the songs—in the past he would go to stores themselves to retrieve songs, today he retrieves songs using the services themselves: “You don’t need to move a foot, or leave home” (H.R.)

The third question related to adding new songs. We found the following methods: searching for a song after hearing it on the radio; searching for new songs on the service itself; song recommendations, offered by the service itself, based on user’s preferences; notifications from the service itself about new songs by artists followed by the user; checking Facebook; and checking the website Billboard.[[1]](#footnote-1)

The fourth questions discussed the ownership of streamed songs. Opinions were divided over this question: two of the interviewees claimed that they do not feel that they own the songs. One, however, claimed that he feels that his song collection does belong to him, at least temporarily. The second claimed that she does not feel like she owns a musical collection, noting that she is dependent on wireless internet; the third interviewee argued that the services he uses, Spotify and Pandora, make him feel better for four reasons. First, because they are both free and paid services. Second, because he can create playlists and control the order of their playback (using just a smartphone). Third, the feeling that “I’m not doing something illegal” (H.M.) Fourth, his approach to the service as “a song library in a concentrated App, in this case, Winamp”.

The last question addressed the topic of streaming services as a social activity. All argued/claimed that these services can be used for social activity; some, however, qualified their answers: one argued that the service he uses, Spotify, is like a social network but without the option to upload a personal status. The options included are: a toolbar showing the songs his friends are listening to, sending songs and messages to friends, and uploading a song he is currently listening to on Facebook. The service can thus constitute social activity. He also mentioned that the other service he uses, Pandora, is less social, and inspires a feeling of individualistic listening. The second interviewee mentioned SoundCloud as a social service, though he said that he does not take advantage of this capability. The third interviewee mentioned that social activity on streaming services is not as pronounced as on social media networks and that if she wants to share a song she will usually do so on Facebook. She mentioned that she does not take advantage of the sharing option on the service she uses, SoundCloud. Nevertheless, she emphasized that the option on SoundCloud to post comments in songs is very exciting “it’s super exciting to see someone comment on someone else.”

# Discussion and Conclusion

In this section, we will present our conclusions, based on our literature review and the findings detailed in the previous sections. First, we will present our conclusions about each one of the research questions separately. Then we will present a general summary and provide an answer to the study’s main question. We must note the that the findings are limited for the following reasons: first, the small number of interviewees and their great diversity; second, their high levels of musical and technological awareness. We therefore add that these conclusions apply only to the present study.

In the first question, we sought to conceptualize and compare listening methods in the past and today. It appears that the reasons cited by the interviewees for using streaming services was largely similar; selection, convenience, availability. We assume that some imagination can support the definition of these activities as “personal information management”—organizing for more convenient retrieval in the future (Bergman, Beit-Marom & Nahmias, 2006). The difference is the built-in recommendation feature in streaming services. Even in “archaic” forms of listening, one can on various music players receive song recommendations. These recommendations, are, however, not always built into the service. Recommendation for music through these players is very artificial—usually through external aids/components/auxiliaries such as chats and various forums.

The second question addressed song retrieval—before and after the use of streaming services. We see that in the past, retrieval was very general—based on very broad categories (artist name, album, music genre). Today, while a song can still be searched for with these categories, more focused options also exist: such as, search by specific track name or even lyrics. This supports statements about the impact of the appearance of MP3 files and Napster: they made song retrieval more focused and specific (Denegri-Knot & Tadajewski, 2010; Swanson, 2013).

That being said, some interviewees have yet to completely abandon their old retrieval habits. Even after connecting to streaming services, they continue to use relatively old retrieval methods, such as Google searches.

In the third question, we examined how users added new songs. Findings show that some interviewees search for new songs on old, non-streaming media channels such as Facebook and the radio—alongside new ones. We can refer to all these additional channels with a generic name “supporting/auxiliary/assisting media channels.” Our assumption is that they are used to enhance a user’s listening experience on a steaming service. In any case, this conclusion supports the previous one about the continued use of old song-retrieval methods.

The fourth question addressed the question of ownership of streamed songs. In the past, one fully owned a purchased album or downloaded songs (whether through legal means or through pirating). Today, however, it appears that the feeling of ownership depends on two main conditions: the first, is payment. A feeling of legal ownership exists as long as there is the possibility of paying for songs on a streaming service. This payment can be considered parallel to payment for a physical album. The second condition is the internet connectedness required—i.e., must one be online or not to access songs. The feeling of ownership persists as long as one can listen to songs without needing to be connected to the internet. As mentioned in previous sections, listening to songs on streaming services offline is only possible with payment. Thus, these two conditions are related. By contrast, playing private files on one’s computer requires no internet connection, and therefore a feeling of ownership does exist. Nevertheless, some interviewees mentioned that they felt that listening on streaming services is temporary. In any case, for a feeling of ownership to exist, both conditions must be fulfilled. We should mention that those who expressed feelings of ownership, refer to both a song folder and streaming services in the same way—as concentrated music libraries.

In addition, we can also deem the ability to fast-forward/skip songs/tracks a condition. We should qualify this by mentioning that one can fast-forward/skip tracks on freemium streaming services as well (though this is limited)—that is, those same services used by interviewees who did not feel ownership. Therefore, fast-forwarding/skipping tracks is not a necessary condition in terms of the findings in this study.

The fifth and final question addresses listening to music on streaming services as a social activity. Our conclusion, based on findings, is that the more a service operates like a social network the greater the potential for it to be used for social activity. In other words, the more it offers options available on classic social networks (such as Facebook), e.g., posting statuses—the more social it will be. As mentioned in the literature review, streaming services allow listeners to create and manage their own playlists and to share them with their friends (Nguyen, Dejean & Moreau, 2014; Snelson, 2011). They thus, in practice, make the services more social.

We also found that the interviewees prefer to attribute to these services those operation for which they were originally intended. That is, they distinguish social networks, intended for social activity, from a streaming service which is intended for playing music. As far as they are concerned, the social options offered on streaming services, are just that—options; none of the interviewees have taken advantage of them. If they do wish to engage in some kind of online social activity, they prefer to do so on a normal social network.

Now to summarize this study, we will discuss our main question : **is personal information management manifested in the use streaming services and if so, how?**.

We can see that streaming services are yet to be used as real personal information managers—this despite their similarity to more archaic listening methods discussed above. Users approach streaming services as personal information managers only if they pay for them and thus can use them offline. These are the two conditions mentioned above which afford users a feeling of ownership—the same ownership which is connected to the subject of personal information management. When at least one condition is absent, the user will not feel ownership and will therefore not use the service as a personal information manager.

In this context, we can compare two situations: listening to music on a paid streaming service, offline; and transferring tracks from a physical album—which cannot be changed—to the computer. In both cases, one can listen to the music whenever one wants, regardless of internet connection and can do so legally, with full, unlimited control over the organization of folders and play order. In other words, the user can use the service as a personal information manager. In the case of streaming services, this possibility exists, as mentioned, only under certain conditions.

We can say in summary, that streaming services are still developing. It is, therefore, possible that their state today represents an intermediate stage preceding services which will provide a feeling analogous to personal information management, as reflected, for example, in the organization of files on a computer. It should be noted that there are users today who do treat these services as personal information managers. However, we believe that in the future this will become far more prevalent. As thing stand today, streaming services still cannot completely serve this purpose. A long road lies ahead of this goal. Until then, we will continue to use these services as capable radio players.

1. Bilboard = an American magazine covering the music industry, presenting, among other things, music parades/tours/lineup [במקור: מצעד ?] in a variety of genres. [↑](#footnote-ref-1)