# THE TREBLE WITH TECHNOCRACY:

## RECONSIDERING PATRON INTERACTIONS WITH STREAMING MUSIC

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Libraries serve as the foreground for public exposure to new technologies, especially within disadvantaged communities, for instance, by making Internet computers available, hosting robotics programs, and introducing immersive reality (i.e., augmented reality and virtual reality). Libraries have also incorporated a variety of automated technologies to benefit library services. Integrated library systems (ILS) track circulation and use of public resources. Linked data further defines controlled vocabularies and improves information discovery. Radio frequency identification (RFID) chips streamline circulation and reinforce asset security. Artificial intelligence (AI) identifies metadata, automates item descriptions, provides real time distribution plans for floating collections, and enhances search engines for online catalogs.[1] Amazon Echoes, powered by algorithmic natural language processing, help manage patron accounts and provide reference services.[2]

Despite how they may enhance patron experiences, technologies dependent upon the use of personal information raise questions about the ethics of recording user behaviors. For example, RFID chips were alleged to track and profile customers,[3] and ILS was thought to surveil information access and computer usage, piquing the public's concern when the Patriot Act was enacted.[4] Furthermore, Amazon's Alexa can "read aloud in a deceased loved one's voice,"[5] which suggests that Alexa devices, like the Echo, are retaining voice samples of users on Amazon's servers, and headsets used to interface with the Metaverse, an online social environment based in virtual reality, track eye movements and facial expressions in order to leverage human neurology, thought processes, and other biometrics.[6]

Former American Library Association President Loida Garcia-Febo's call to action stated that librarians should be prioritizing AI in scholarly and professional communications.[7] Library patrons routinely encounter AI programs online, operating in the background of websites and mobile apps such as YouTube, Facebook, and Spotify among others. As information specialists, librarians are in a unique position to debate the impacts of AI, as this profession is among

the few that specializes in the conscientious implementation of information technologies. The following discusses the ethics of employing automated digital rights management and customer relationship management systems on social media and music streaming platforms.

## The Early Days of Rights Management

During the late 1990's, peer-to-peer (P2P) networks like Napster, LimeWire, and Kazaa surprised media critics and shook the music industry as they were rapidly adopted by consumers. The music industry was predicated upon the production and sale of physical iterations of music, and it had not occurred to record labels and retailers that customers would opt for downloading music from the Internet.

In response to sharing copyrighted media en masse, the Federal government was lobbied to pass the Telecommunications Act (1996), the Digital Millennium Copyright Act (1998), and the Sonny Bono Copyright Term Extension Act (1998), which outlined the repercussions for violating intellectual property rights.[8] Additionally, the music industry sought to independently control the flow of content separate from the legal system in the way of digital rights management.

Digital rights management (DRM) dictates terms of use while monitoring customer adherence to said agreement by encoding an ordered failsafe into digital files. DRM code is inserted into music files during the production of songs and albums, remaining in effect throughout the lifecycle of the product and regulates the playback of music.[9] Watermarking, for example, embeds information regarding the ownership of the content and the systems from where the songs originated,[10] allowing for positive identification to combat bootlegging and digital piracy. While DRM and copyright law address the unauthorized reproduction, sale, and distribution of physical and digital media, the proliferation of music on social networking and other user-driven streaming sites was an unforeseen obstacle.

## Employing Artificial Intelligence for Digital Rights Management

After succeeding in shutting down P2P networks for abusing copyright restrictions, the music industry began to focus on social media, often finding infringing content on YouTube and other video sharing platforms. Court rulings, though, determined that for such companies to be held accountable for the content they host, they must first know the point of origin of the files uploaded to their websites. Because the entire upload process is automated and therefore does not meet the criteria for knowingly posting infringing material, these companies are able to claim Safe Harbor under the Digital Millennium Copyright Act. This protects them from liability but still requires them to remove infringing content upon request.[11]

YouTube, however, took it upon itself to develop a (semi)autonomous system in order to more readily comply with the music industry's demands and the requirements of copyright law.[12] It launched its automated copyright enforcement system, Content ID, which is based on a combination of perceptual hashing and artificial neural networks.[13] Perceptual hashing extracts hash data from an uploaded file and compares them to samples collected from copyright owners.[14] This method allows YouTube to identify exact copies and variations of the original work such as live performances, covers, and remixes.[15] Artificial neural networks are made up of several layers of linked nodes which simulate the organic neural networks of animals and humans.[16] Their complex makeup and training regimen make them suited to solving complicated, stochastic problems in real time, enabling them to instantaneously recognize musical similarities.[17] In 2018, Google reported that Content ID handled nearly 98 percent of all copyright issues,[18] indicating minimal human involvement.

Once Facebook began allowing users to upload videos, the company was inundated with complaints from record labels

due to users infringing copyright.[19] In response, Facebook signed licensing deals with Universal, Sony, and Warner, which gave users permission to include music in their videos.[20] Facebook eventually deployed its own automated copyright enforcement system, Rights Manager, which operates like YouTube's Content ID, in order to streamline compliance with takedown requests and copyright law.[21]

Both Content ID and Rights Manager constantly monitor YouTube and Facebook respectively. When livestreams with infringing content are detected by their neural networks, the feeds are interrupted with copyright notices delivered to both copyright owners and users. When processing recordings, the systems extract hash data and compare them to samples provided by copyright owners. When matches are identified, both copyright owners and uploaders receive notifications.

Responses are typically preset by the copyright owner's DRM profile and most often results in embedding ads in the video to establish income for the copyright owner. This reflects how YouTube automatically monetizes 95 percent of claims, resulting in user uploads producing 50 percent of revenue generated by YouTube on behalf of the music industry.[22] Controlling nearly half the market,[23] YouTube is the most prevalent music streaming service with much of its content being produced by the average uploader.[24] Music also accompanies a wide array of entertainment such as dance videos, movies, tv shows, and videogames, which suggests that the music industry can claim a broad spectrum of material.

## Customer Relationship Management

In addition to DRM, virtual platforms utilize another set of algorithmic programming called customer relationship management (CRM). This AI's purpose is to understand consumer preferences through which it encourages brand loyalty by providing a custom-tailored experience. The more often clients engage with content, the more accurately the system can judge what selections they will enjoy. This information is constantly tracked, and user profiles are compiled based on a variety of customer interactions such as likes, dislikes, skips, play-throughs, ratings, reviews, and comments.[25]

Algorithms sort through a library of music, classifying each title based on degrees of similarity to songs preferred by listeners as indicated by their profiles. As the system procures additional titles, users repeatedly interact with selected content which further enhances the AI's ability to generate agreeable suggestions.[26] The more listeners who engage with the system, the more information it retains to analyze collective musical tastes and base suggestions on songs enjoyed by others. If it finds a group of profiles with similar preferences to the user in question, it begins to recommend songs to that user based on the collective preferences indicated by the group of profiles.[27]

Platforms also categorize music utilizing listening machines. These autonomous programs perform waveform analysis to evaluate a song's melody, harmony, tempo, timbre, and density, giving CRM the ability to recommend selections consistent with musical similarities among songs, albums, and genres. Such characteristics also facilitate the classification of music according to style, mood, and activities which allows the system to recommend entire playlists based on an array of dispositions and emotions.[28]

## Responding to Ethical Concerns

Both DRM and CRM raise concerns over limiting rights to privacy, freedom of expression, and fair use. AI is often thought of as being objective because they are machines, but because these systems are designed by people, they are subject to human error. Oversights in their framework often lead to unexpected consequences, some more serious than others. As such, it is important that as information specialists, librarians recognize these shortcomings and educate their stakeholders accordingly.

DRM has shown great promise

for protecting copyrighted content; however, these systems are not as accurate at identifying infringement as their developers claim. Zhang et al. (2018) demonstrated YouTube's failure to identify 26 percent of copyright infringing livestreams while also mistakenly interrupting 22 percent of non-infringing broadcasts.[29] Furthermore, these systems, as mentioned previously, are designed to recognize renditions of musical works as exact matches of the copyrighted material which means that Content ID and Rights Manager will not make allowances for fair use and reproductions of works from the public domain. Berkowitz (2022) compiled a series of instances where both Facebook and YouTube mistook individual performances of classical music for copyrighted content,[30] and preliminary results of an experiment being conducted by the author of this article show that of Beethoven's thirty-two piano sonatas, Facebook and YouTube each misidentified 28 percent of recordings for copyright infringement.

These studies suggest that uploaders are systematically targeted for copyright infringement to control the value and scarcity of public domain music and by profiting from the efforts of unaffiliated musicians, social media and music corporations repeatedly capitalize on free labor.[31] Although dispute processes exist for both Facebook and YouTube, they require knowledge of copyright law, and because recourse is handled at their discretion, these companies can leverage their systems to enforce constraints and elicit compliance.[32] This effectively establishes a technocracy where DRM autonomously governs the distribution, usage, protection, value, and tracking of content beyond what copyright law intends,[33] ignoring freedoms of expression and fair use while privatizing the public domain.

CRM has demonstrated success in predicting what customers will enjoy, but combined with desperate content creators, they facilitate an environment where click farms propagate and exploit impoverished populations. CRM values music based partially on popularity (i.e., level of customer interaction). Songs with higher streaming metrics are often at the top of recommendation lists which creates obstacles for small labels and emerging artists to generate revenue and fame, a dilemma in its own right. In response, some musicians will pay click farms to artificially inflate the metrics of their music. These sweatshops located throughout developing countries pay poverty wages for people to repeatedly interact with online content, manufacturing demand for artists who have yet to find their audiences.[34]

As mentioned before, CRM continuously runs in the background of streaming platforms, engaging in dataveillance as they build customer profiles based on listening habits. Usage data collected from audiences playing functional background music (i.e., songs meant to accompany activities) reveal intimate details about a user's daily routine such as the setting, duration, frequency, and nature of regular tasks. This information along with customer-volunteered demographic data are then sold to commercial advertisers who use this information to improve market penetration for products and services.[35] In doing so, people are reduced to metadata, perpetuating a technocracy where people's rights to privacy are subservient to their roles as consumers.[36]

Librarians were among the first professional groups to advocate for freedom of expression and fair use as these rights were being limited by stricter copyright legislation and DRM.[37] Furthermore, librarians quickly took notice of public preferences for streaming media as circulation of virtual materials steadily outpaced physical mediums.[38] Libraries have been and still are at the forefront of these issues, and librarians should consider how they will portray these services to the public and protect their patrons from exploitation.

Berkowitz (2022) outlines how libraries can implement instruction to cover topics such as copyright law, the public domain, fair use, and automated copyright enforcement. He also

explains how copyright dispute processes work on social media and suggests conducting help sessions to assist users. Libraries facilitating significant law collections and music assets are encouraged to take the first step in implementing these programs.[39] Libraries, as experts in patron privacy, can also educate the public on how data is collected, utilized, and sold to raise awareness of how their information is being commercialized. Those libraries employing the use of automated voice assistants are likely already well equipped to discuss the issue of dataveillance in their communities.

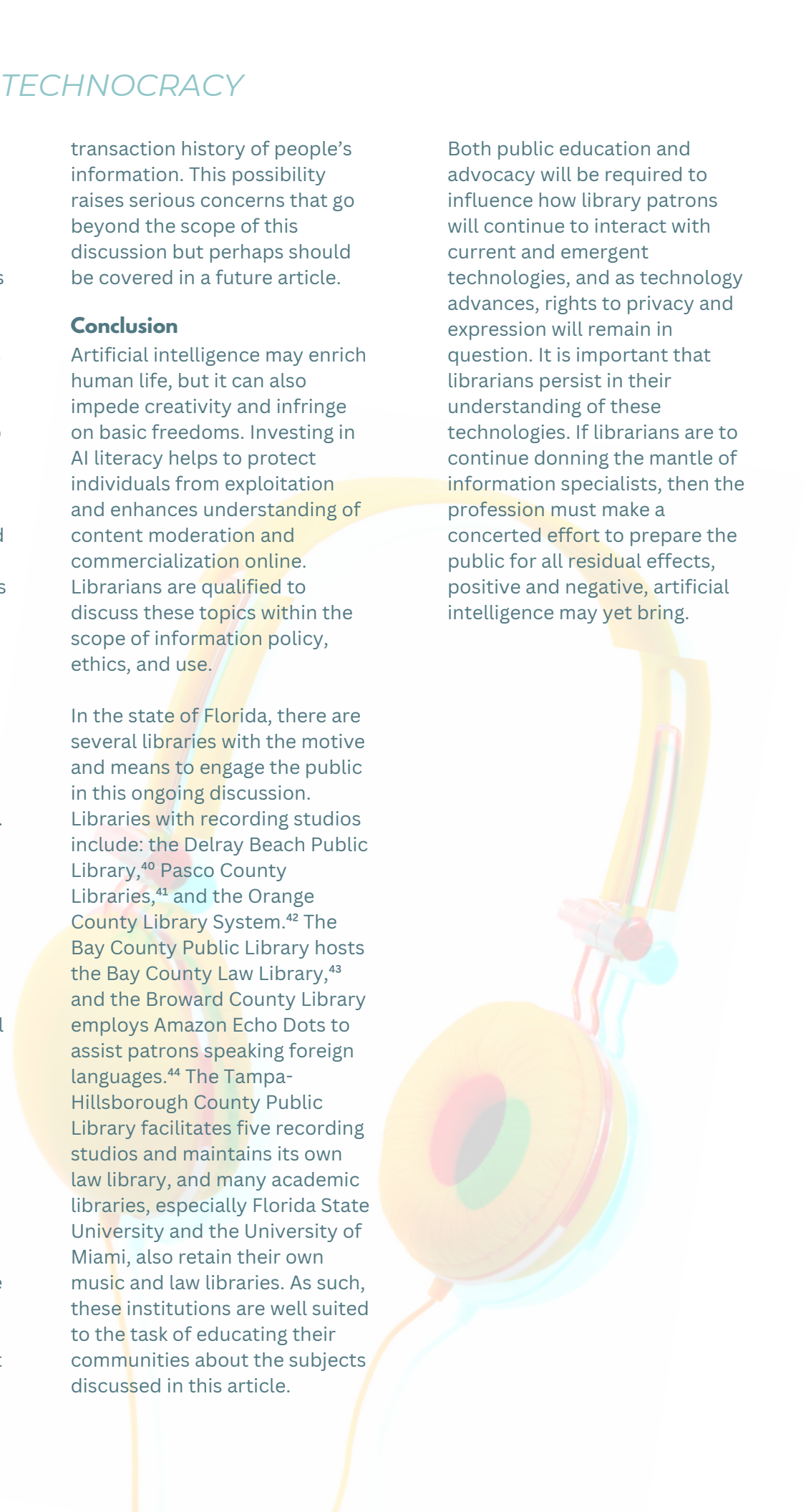
Furthermore, libraries can advocate for technological solutions and government oversight that would improve services and provide protections for individual rights. Content ID and Rights Manager could start by incorporating linked data to assist in recognizing works from the Public Domain, and after confirming identification, they could utilize waveform analysis to distinguish uploaded material from copyrighted content. Also, if dataveillance continues to expand, technocracy will eventually define the economy. Government agencies should prevent this from happening by either heavily regulating or banning the sale of personal data. Otherwise, corporations will persist in profiting from free labor, or for the sake of transparency, companies may be mandated to regularly report on the usage, market value, and transaction history of people's information. This possibility raises serious concerns that go beyond the scope of this discussion but perhaps should be covered in a future article.

## Conclusion

Artificial intelligence may enrich human life, but it can also impede creativity and infringe on basic freedoms. Investing in AI literacy helps to protect individuals from exploitation and enhances understanding of content moderation and commercialization online. Librarians are qualified to discuss these topics within the scope of information policy, ethics, and use.

In the state of Florida, there are several libraries with the motive and means to engage the public in this ongoing discussion. Libraries with recording studios include: the Delray Beach Public Library,[40] Pasco County Libraries,[41] and the Orange County Library System.[42] The Bay County Public Library hosts the Bay County Law Library,[43] and the Broward County Library employs Amazon Echo Dots to assist patrons speaking foreign languages.[44] The Tampa-Hillsborough County Public Library facilitates five recording studios and maintains its own law library, and many academic libraries, especially Florida State University and the University of Miami, also retain their own music and law libraries. As such, these institutions are well suited to the task of educating their communities about the subjects discussed in this article.

Both public education and advocacy will be required to influence how library patrons will continue to interact with current and emergent technologies, and as technology advances, rights to privacy and expression will remain in question. It is important that librarians persist in their understanding of these technologies. If librarians are to continue donning the mantle of information specialists, then the profession must make a concerted effort to prepare the public for all residual effects, positive and negative, artificial intelligence may yet bring.



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