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Provincializing Spotify: Radio, algorithms and conviviality

ABSTRACT

Focusing on early experiments with algorithms and music streaming at WFMU, the longest-running US freeform radio station, and the Free Music Archive (FMA), a curated open music website, this article shows how commercial streaming services have been indebted to independent, open music infrastructures but have then erased and denied that history. The article ‘provincializes’ music streaming platforms such as Spotify by focusing not on their commercial aims but instead on the ‘convivial’, collaborative practices and spaces that their software engineers and users inhabited. I analyse an experimental national telephone broadcasting service at WFMU in 1989, an algorithmic WFMU radio stream ‘The Flaming Robot of Love’ during the Republican National Convention in 2004 and the ‘Free Music Archive Radio App’ that recommended tracks on the FMA website from 2011 to 2016. The app worked with an application programming interface (API) from Echo Nest. Echo Nest’s algorithmic recommendation engine also powers most commercial streaming services today. When Spotify purchased Echo Nest in 2014 and took the start-up’s open API offline in 2016, it engaged in ‘primitive accumulation’ of open-access knowledge and resources for commercial purposes. The FMA closed in 2019 and now only exists as a static site. As social institutions, however, WFMU and FMA ‘recomposed’ – adapted to a new medium and a new political context – collaborative engineering practices of the early broadcasting era. The article argues that moments of oppositional ‘conviviality’ in media culture such as the FMA should be analysed as elements of a continuous struggle.

KEYWORDS

WFMU
Free Music Archive
Spotify
algorithms
conviviality
media culture

1. This article is an expanded version of a keynote talk delivered at the 6th ECREA Radio Research Section Conference held at the University of Siena, Italy, on 21 September 2019.
2. An important moment for the format's development was Federal Communications Commission's decision on 1 July 1965 (enforced on 1 January 1967) to forbid FM stations from simulcasting more than 50 per cent of programming from their parent AM affiliates. FM stations then turned to rock radio and freeform.
3. Literature on the open-source era is vast. See especially Kelty (2008), Coleman (2012), Lessig (2004) and Benkler (2006).

In his 1973 book *Tools for Conviviality*, anarchist philosopher Ivan Illich argues that convivial tools are 'opposite to industrial productivity' and promote 'autonomous and creative intercourse of persons, and the intercourse of persons with their environment' (1975: 24).¹ At first glance, freeform music radio fits this description, and music recommendation algorithms definitely do not. In many ways, these two music delivery methods are polar opposites. In freeform radio, a cult format that emerged in the 1960s, a DJ has complete control of the show, including music airplay, on-air conversations and listener participation.² Stations that embrace this format today include KPFA in Berkeley, CA, WNEW-FM in New York City, and WFMU in New Jersey. Even Sirius satellite radio toyed with the format when it invited Bob Dylan to host a freeform *Theme Time Radio Hour* (2006–9). The freeform format remains a foil for algorithmic streaming services such as Spotify, Deezer and Pandora that emerged in the early twenty-first century. These services promise users seamless listening experience in exchange for a monthly fee and the right to collect their personal data. *The Baffler* critic Liz Pelly's headlines mocking Spotify, 'Discover weakly' (2018a) and 'Streambait pop' (2018b), are just the wittiest examples of stringent criticism streaming services receive from music critics and fans. Some stations capitalize on this disdain: KEXP in Seattle advertises itself as 'robot-free radio', with a logo featuring a robot under attack by flying vinyl discs (KEXP 2018).

Recommendation services are a prime example of what scholars, following Ted Striphas, have called 'algorithmic culture' (2015). The use of computers in radio music programming goes back to the middle of the twentieth century, when broadcasters used IBM machines to calculate popularity of records played by DJs (Razlogova 2013: 65) and create automatic playlists (Russo 2018). In the twenty-first century, machine learning, often branded as artificial intelligence, has produced algorithmic systems that are hidden – black-boxed – from its users, its critics and even its engineers, yet penetrate deep into everyday life. One way to study algorithms' origins and effects is to examine engineering lab cultures that produce them, like Kate Crawford (2016) and Nick Seaver (2017) have done. Another is to consider the 'convivial', collaborative practices and spaces that form part of the larger world that software engineers and users inhabit – to 'provincialize' commercial streaming services such as Spotify.

Recommendation algorithms used by commercial streaming services today emerged in the context of the open-source movement, including collaborative coding projects, hacker spaces and the Creative Commons copyright that allows for free sharing of cultural content.³ Andrew Bottomley has found, for example, that computer programmers volunteered their services to help several radio stations to begin internet streaming in the 1990s (2020). These early radio experiments with free code, streaming and automation resemble the 'experimenter era' in radio broadcasting in the early twentieth century, when radio amateurs set up broadcasting and listening stations and developed technologies and practices later adopted by commercial broadcasters (Douglas 1987). Here, I will focus specifically on WFMU in New Jersey, the longest-running freeform radio station currently on the air. Open-source software engineers and freeform radio broadcasters pioneered algorithmic practices currently adopted by the corporate streaming services. These early episodes raise issues of labour and authorship in the relationship between 'algorithmic culture' and public culture.

THE FLAMING ROBOT OF LOVE

Initially, users and critics assumed complete automation of recommendation services, including Spotify, launched in 2008. Even Pandora, based on manual coding by musicians and music experts, was advertised as an automated recommendation service. That is when freeform radio became a foil for critics of music recommendation. In response to Sasha Frere-Jones' article about Pandora in the *New Yorker*, a reader wrote:

All this technology has yet to improve on the old radio model: putting yourself in the hands of independent, passionate, and deeply knowledgeable disk jockeys – the likes of which can be found at New Jersey's incomparable WFMU, for example – and following them blissfully into the world of the unknown and unexpected sound.

(Chamberlin 2010: 5)

Frere-Jones argued that 'the job' of a radio DJ 'lingers as a template for much software' (2010). But there was no talk at this point of a DJ actually working alongside software.

Ken Freedman, WFMU station manager, agreed with the critics. In his video message for a new Freeform Portland KFFP-LP station, recorded in 2015, he advises the new station not to fear corporate streaming platforms. 'What sets local freeform radio apart from certain services like Spotify and Pandora, is real living freaking human beings!' he says.

Community radio and freeform radio is putting humans back in charge of the programming and in that way it's offering something very, very different from what you get from these other algorithmic music recommendation services – and that's human contact and human feel.

(Freedman 2015)

This position is consistent with the station's history. WFMU was founded in 1958 and adopted freeform format in 1967, in opposition to commercial, ratings-driven radio stations (Wolf 1999).

WFMU's relationship with algorithms is more complicated, however. When I interviewed Freedman in 2013, he mentioned that the station had used them: 'A few times, we set up highly automated programming services. If you do it well, it can sound very un-computer-like, it can sound very un-algorithmic' (2013). During the 2004 Republican National Convention, at the height of the Iraq war, WFMU broadcasts five-day non-stop programming critical of the RNC and in support of anti-war and social justice groups protesting in the streets. 'We're remixing the RNC', their poster announced. 'You can even use your TV picture & our sound for an audio hijack!' (Anon. 2004) The station broadcasts live political music and political comedy. But it also used the SAM Broadcaster software to create an automatic channel, 'The Flaming Robot of Love'.⁴ The semi-automated process let DJs arrange mp3s of different genres into separate folders and then set up conditions for playing. You could ask the software to play station IDs or spoken world tracks at certain intervals, or to never play a punk song after a bluegrass song, or to play no more than three power pop songs in one hour. 'It sounded really good', Freedman remembered, 'like it was a human being with an WFMU sensibility that worked behind it' (2013). Collaboration between a knowledgeable DJ

4. 'SAM' stands for 'Streaming Audio Manager'. SAM Broadcaster software still exists in a more expensive and cloud-based subscription mode (Anon. n.d.).

and an algorithm, and a clear political purpose behind the project, made 'The Flaming Robot' a 'convivial' stream.

Around the time I interviewed Freedman, streaming services stopped touting artificial intelligence and returned to the idea of human curation. A new online music service, Music Beats, offered a curated recommendation service with fanfare, touting it as a novel alternative to automated recommendation. 'A new music service that combines the power of human curation with technology to always deliver the right music to you at the right time. Get playlists, curated by the best music experts' (Anon. 2014). Within two years, Apple Music acquired the service. Then within two years, once again, music periodicals announced a new wave of 'disruption'. Spotify, Apple Music and Google Play began to combine their algorithm-driven recommendation system with human curators. The tech press trumpeted the practice as a revolutionary business strategy. *Buzzfeed* profiled 29-year-old Rocio Guerrero Colombo, a Latin music expert and one of the 50-person human curation team at Spotify who created over 4500 playlists (Ugwu 2016). Curators like Colombo 'have amassed unusual influence' as 'secret weapons' in 'the new arms race to re-define our relationship with music', *Buzzfeed* concluded, and their playlists are 'the format of the future' (Ugwu 2016).

This disruption narrative was misleading. As Jeremy W. Morris (2015a: 456), Nick Seaver and Kariann Goldschmitt (Seaver 2017: 8–9; Goldschmitt and Seaver 2019) have pointed out, Music Beats from the beginning used recommendation software, and Spotify curators rely on complex app data on users' listening patterns to construct playlists today, wielding what Tiziano Bonini and Alessandro Gandini call 'algor-torial power' (2019). Streaming services claimed innovation credit based on historical amnesia, forgetting that human DJ-computer symbiosis had been part of radio broadcasting for decades (Razlogova 2013; Russo 2018). Yet each time the balance of this symbiosis in music recommendation changed, music industry press and advertisers presented the change as a revolutionary 'disruption' coming from the industry, invented by managers at Music Beats or Spotify. In fact, these companies were walking back their original claim for the power of artificial intelligence and machine learning to replace DJs completely. They were also drawing on the freeform experiments that first conceived and implemented the collaboration of humans and algorithms in online music curation.

The early history of remote music streaming recalls early years of radio. In 1890s, the telephone was briefly used as a broadcast medium. In 1893, a Hungarian music fan could call a number on his phone and listen to an opera on a Telefon Hírmondó telephone broadcasting system (Sterne 2002: 193). WFMU streaming emerged in a similar way. Brian Redman, a volunteer at the station, had helped develop videophone at Bell in the 1970s and still had a contract with Bell research arm Bellcore for experimental projects. In 1989, Redman set up an 800 number that listeners could call from anywhere in the United States to listen to WFMU. When Bell cut off the service a year later, WFMU got a lot of angry phone calls from as far as Seattle, Chicago and Los Angeles. It turned out that many station fans who moved away used the feature to listen the radio at work on their phones, very much like office workers listen to streaming music today. 'It blew my mind', Freedman remembers.

What I considered silly services had actually become really important to people. So when I read a couple of years after that, in 1992–1993, that the internet was actually going to support music and radio I became very excited about it and wanted the station to get on it right away.
(Freedman 2013)

WFMU was one of the first stations to experiment with various open-access music streaming services. It has archived mp3 playlists for its show online since the late 1990s. As early as 1998 WFMU's automatic 'accuplaylists' displayed song information in real time reloading the page every 45 seconds during the programme. In 2001, 2,000 people listened to WFMU live stream or archive tracks – about 10 per cent of the station's daily audience. WFMU had an iPhone app in 2007 and hacked music streaming on iPhone before Apple made this feature standard (Freedman 2013; Razlogova 2013). All these services drew on volunteer work of music lovers who were professional programmers. For example, programmers at a web start-up oven.com helped WFMU to design their streaming set-up. The company went under in the dot.com bust in 2001, but some of its engineers still volunteer at WFMU today (Freedman 2013). These collaborative projects resembled 'convivial' listening and broadcasting in the United States in the 1920s, when engineers would often call into radio stations to give advice on radio sound or would set up collective radio listening stations for the public on beaches and in private houses (Douglas 1987).

A PODSAFE MUSIC LIBRARY

The history of human–algorithmic collaboration in music recommendation also traces back to a non-profit, the Free Music Archive (FMA). WFMU launched FMA in 2009 as a public access 'podsafes music library' with a state grant from a 'payola' lawsuit settlement. In 2004, the New York Office of the Attorney General, then led by Eliot Spitzer, uncovered that the four major record companies (EMI, Sony, Universal and Warner Brothers) and two major radio broadcasters (Entercom and CBS) had used payola – bribed radio stations and DJs to play particular songs (Thompson 2006). Record companies paid for airplay with sneakers, PlayStation, flat-screen TVs and plane tickets to Florida (Attorney General to the State of New York 2005). Using this evidence, the state extracted consent decrees from the companies to establish a regulatory regime, collected approximately \$30 million in settlements, and set up the New York State Music Fund to aid local music artists. WFMU, along with the Arab American Arts Institute of Brooklyn, Pauline Oliveros' Deep Listening Institute, and others, was a beneficiary of this public programme (Anon. 2006; Thompson 2006).

The FMA was launched as a public service. It was inspired by the open-source software movement that began as a way to share computer code and then inspired the sharing of creative content as well (Coleman 2012; Kely 2008; Benkler 2006). It also drew on the Creative Commons copyright licensing system (CC), founded in 2001 to codify sharing and mixing of free creative content (Lessig 2004). All the uploaded tracks were cleared for use through a CC licence or a direct agreement with the FMA. Other open music collections existed at the time, such as the Internet Archive, a massive non-profit digital library founded in 1996 and based in San Francisco; Jamendo, a Luxembourg-based digital service for free music; CC-mixer, the first CC music community;

and FreeSound, a collection of sound effects. Among these, FMA stood out as the only curated site (Sigal 2013).

The archive hosted a collection of downloadable tracks curated by free-form radio stations, independent labels and small concert venues. The original founders – Ken Freedman, Assistant Station Manager Liz Berg, and the founding FMA Director Jason Sigal – launched the site with a lot of music already available, and together with other known curators, such as KEXP, a public radio station in Seattle. The international group of curators included WeirdoMusic Recordings net label from the Netherlands, YesNoWaveMusic from Indonesia, and ‘Excavated Shellac’, a music blogger who digitized international out-of-print 78 rpm recordings (Moss 2009). The collection drew on archival tapes of in-studio performances, studio recordings that producers were willing to share, net labels that released all their music under Creative Commons, online magazines that curated Creative Commons music, and others. One such contributor was the Isabelle Stuart Gardner Museum in Boston. Because of original donor restrictions, the museum could not host any temporary exhibits, so they organized music performances and released public domain classical compositions under a CC licence. ‘Creative Commons for them was a way to stretch their art beyond the museum walls’, Jason Sigal explained. The FMA ‘helped people discover it’ (2013).

The FMA allowed creative digital producers to combat restrictive intellectual property legislation and test the application of Creative Commons licences. In 2007, when US government introduced legislation to raise royalty rates for internet broadcasters, it seemed that the new rates would be prohibitive for independent net stations, prompting the Save Net Radio campaign of public protest that united the streaming service Pandora with independent internet radio stations. FMA founders saw the archive’s royalty-free streams as a resource for radio and podcasts (Sigal 2013). Unexpectedly, independent film and TV producers, and public broadcasters such as PBS became the most frequent users of the archive, mining it for free soundtracks. FMA staff helped users draw up simple contracts that would allow for semi-commercial use, such as using music for an art film that would be shown at a film festival that used advertising, or an installation in a commercial store. ‘We are trying to facilitate direct collaborations’, Sigal explained in 2013, ‘we are not a stock music library, we are a library for creative works of art’. In the course of its existence, FMA received several grants, including funds from the MacArthur Foundation and the National Endowment of the Humanities. In 2018, it had to shut down because public funding petered out: the last NEH grant they got was just one third of its previous amount (Stephen 2018).

When the FMA announced its closure in November of 2018, the news was reported in major music publications – such as *Pitchfork* and *The Wire* as well as on tech sites like Reddit and Slashdot. ‘The site may stay up a little bit longer to ensure, at the very least, that our collections are backed up on archive.org and the Wayback Machine’, announced the last FMA director, Cheyenne Hohman.

If it just goes into archive.org, it’s going to be there in perpetuity, but it’s not going to be changing at all. It’s not going to be the same thing, that sort of community and project that it was for [...] almost 10 years.

(Stephen 2018)

Immediately musicians who had their work on the site tweeted for users to download and copy files. Slashdot user and filmmaker Bobrick lamented: 'Jesus christ, I'm gonna be downloading as much stuff as I can [...] this was my main music source for videos. This is a huge loss, the FMA is a godsend for a lot of indie production of all types' (2018).

In the ten years of its existence, the FMA was part of a transnational digital public media infrastructure in search for new distribution models and under pressure from global corporate streaming platforms (Fauteux 2017; Cwynar 2017). The archive collected over a hundred thousand songs and dozens of curators. It provided a publicly funded avenue for musicians to break into the music business. 'The FMA is literally the only reason anyone ever heard my music when I was starting out', the ambient musician Chris Zabriskie told *The Verge* magazine. 'It wasn't just the permissive Creative Commons licensing, it was the FMA as a platform that introduced my music to millions of people over the years. It's the reason I have a career' (Stephen 2018). In 2018, this public avenue was gone. The FMA ran for a few more months with additional donations and then was sold to a camera gear rental service, KitSplit, who then resold it to Tribe of Noise, a for-profit online music platform for sharing Creative Commons-licensed music (Houghton 2019). The FMA now exists as a static searchable site maintained by Tribe of Noise and as a collection in the Internet Archive.

A CREATIVE COMMONS PANDORA

Besides hosting free music, the FMA provided an alternative to commercial algorithmic recommendation systems. FMA curators offered disparate music genres but shared WFMU's appreciation for independent artists. FMA founders hoped that 'if you come to the site through various curators who are similar to WFMU [in sensibility] you can find stuff that you like' (Sigal 2013). In 2011, a music recommendation start-up Echo Nest mapped the FMA application programming interface (API) to its own 'Rosetta Stone' API and released the code for interfacing the two online (Anon. 2011). Software developers could now create apps that could 'psychoacoustically analyze [FMA] tracks for abstract properties like mood and separate [FMA] library from the rest of the Echo Nest universe' (rosso 2016). The first apps were developed at a Radio Hack Day during WFMU's RadioVision Festival devoted to freeform radio and independent music. A few weeks later, WFMU announced the open-source 'Free Music Archive Radio App', otherwise termed a 'Creative Commons Pandora' (Sigal 2011).

The FMA Radio app came out of a Music Hack Day (MHD) hosted by Echo Nest in Boston. Several times a year worldwide since 2009, musicians and software developers collaborate at MDHs to produce open-source musical-technical solutions using the APIs of music archives, start-ups and platforms (Dubber 2016). Jeremy Sawruk, Robby Grodin and Julie Vera made the FMA Radio app using the combined FMA/Echo Nest's music recommendation engine. Both Sawruk and Grodin were musicians and released their work under Creative Commons. At previous MHD events, Sawruk had built 'Feedtunes', which turned Twitter trends into playlists based on song lyrics; and Grodin coded the 'Toscanini gestural interface', a platform for motion sensitive musical applications (Sigal 2011). The FMA Radio app integrated these hackers' imagination, the eclectic taste of FMA curators and the machine learning of Echo Nest's algorithms.

Echo Nest, founded in 2005, is now owned by Spotify. Scholars focus on its role as an ‘infomediary company’ that powers recommendation engines of most commercial streaming services, including Spotify, iHeart Radio and eMusic (Morris 2015a; Seaver 2017). Yet Echo Nest’s participation in open-access projects and debates evolved into something more than a marketing move by a start-up looking for investors. For several years, Echo Nest lent intellectual and infrastructural support to the creation and long-term maintenance of open-source software and open-access media. In this collaborative, ‘convivial’ context, Echo Nest produced the algorithmic infrastructure for much commercial streaming today.

As social institutions, the MDH and the Radio Hack Day events drew on the popularity of hacker cultures (Coleman 2016). Since the late 1990s, anarchist/autonomist hacklabs and less politicized hackerspaces (Maxigas 2012) have hosted events and workshops, creating ‘places of conviviality around digital technologies’ that collectively build code and model ‘alternative technological arrangements’ (Murillo 2019). Borrowing from this tradition, corporations, governments, NGOs and libraries have been organizing ‘hackathons’ – short-term collective coding projects that aim to solve technical and social problems, but often focus on clever apps and foreclose in-depth political discussion and long-term institution-building (Gregg and DiSalvo 2013; Irani 2019). Certainly, digital music companies use music hackathons such as MHD or Music Tech Fest to encourage outside developers to play for one day with the APIs on their platforms. Some hack day projects, however, have found long-term institutional lives, either at sponsoring companies or elsewhere (Dubber 2016).

The long-term FMA–Echo Nest collaboration exceeded the entrepreneurial hackathon format. It shared its purpose with library and archival hackathons, such as the ones organized by Wikimedia and the New York Public Library, which build up the open data movement and its institutions (Davis 2016). WFMU’s Radio Hack Days aligned with ‘convivial’ hacker community events in that they embraced independent radio as ‘creating connections, creating community and creating companionship’ in opposition to commercial streaming platforms (Freedman 2015). Between 2011 and 2014, at MHDs and Radio Hack Days, software developers built a dozen apps interfacing FMA and Echo Nest. From 2011 to 2016, a version of the FMA Radio app powered music recommendations on the FMA website (rosso 2016).

Echo Nest ran other open-access experiments besides the collaboration with the FMA. Another one was an open alternative to Shazam, a music recognition app first released in 2002 that is now integrated into Apple Siri. Echo Nest reverse-engineered Shazam as Echoprint, in collaboration with Columbia University’s Laboratory for the Recognition and Organization of Speech and Audio (LabROSA) and MusicBrainz, a community-maintained music metadata database. The app aimed to give musicians and hackers control over the range of music available for ‘fingerprinting’ – extracting a small audio sample necessary to recognize a particular song (Ellis et al. 2010). An open algorithm would free developers to create apps that allow users to ‘“convert” a local catalogue of music into any streaming or music service’ (Echo Nest 2011). Echo Nest co-founder and Echoprint co-creator Brian Whitman argued that ‘music fingerprinting should be a service that every developer can rely on’ (Andrews 2011). Whitman’s call for shared music algorithms in 2011 aligned Echo Nest developers with the hacker ethic (Coleman 2012). Today, it clashes with the proprietary infomediary role Echo Nest has as Spotify’s backend.

The FMA Radio app and Echoprint had a common purpose: both aimed to expand access to unpopular, rare or non-commercial music. They tried to solve what Fenwick McKelvey and Robert Hunt call a ‘discoverability’ problem – when recommendation services end up promoting only the most popular tracks (McKelvey and Hunt 2019). The publicly funded open-access approach of FMA and the free and open Echo Nest API provided a solution. Unfortunately, Spotify purchased Echo Nest in 2014 and took the start-up’s open API offline in 2016, making Echoprint, the FMA recommendation engine and other open-source software projects that used Echo Nest API obsolete (rosso 2016). Spotify’s actions amounted to what Marion Fourcade and Daniel Kluttz call ‘accumulation by gift’ (2018), or what a Marxist scholar would also call ‘primitive accumulation’ (Fuchs and Mosco 2017), of open-access knowledge and resources for commercial purposes.⁵

The early twenty-first century was also an era of ‘primitive accumulation’ through piracy of big data crucial to the current explosion of music streaming services. In the first decade of the twenty-first century, many digital recordings circulated via alternative infrastructures: musical blogs with mp3 collections, p2p sites like the Limewire and torrent sites such as the Pirate Bay. Spotify harvested mp3 files from the Pirate Bay website to grow its initial database and test its recommendation algorithms. When Spotify first launched, some of its tracks had tags from pirate groups such as FairLight in the title. Spotify also streamed music from a band that shared their music only on the Pirate Bay and nowhere else. To hide this history, Spotify unsuccessfully sued the researchers whose book *Spotify Teardown* tells this story (Eriksson et al. 2018). Shazam also required a large music fingerprint library to develop its algorithm. In 2003, the company digitized vinyl records owned by a major music retailer, Entertainment UK, in exchange for extracting fingerprints from the 1.6 million digitized recordings, thereby breaking the law: ripping vinyl and CDs became legal in Britain only three years later and then only for personal use (Razlogova 2018). These algorithmic music services at the exploratory stages of app development obtained initial data sets through extra-legal means.

This history points to a larger programme of open-source experimentation and open-access practices at the dawn of music recommendation and streaming era. Echo Nest created the algorithmic foundation for much of music recommendation today drawing, among other resources, on the ‘convivial’ open-source scene and on publicly funded music institutions such as the FMA. Spotify put an end to this period of experimentation and also profited from it. In choosing to use curators in 2013, Spotify was going back to the culture of open experimentation at FMA and elsewhere. Focusing on these early experiments shows how commercial streaming services have been indebted to independent, open music infrastructures from the start but have then erased and denied that history.

In retrospect, the open-source era and the techno-utopianism that sustained it seem naive. Lawrence Lessig’s (2004) and Yochai Benkler’s (2006) optimism about blending commerce and free collaboration has been discredited as values that justified free digital labour in intern-heavy production cultures (Mayer et al. 2009). MDHs co-sponsored by FMA were also sponsored by Spotify and Microsoft, promoting what Lilly Irani called ‘entrepreneurial citizenship’ (2019). Few industry or academic histories of algorithmic recommendation mention piracy as an early source of big data or pay attention to early open-source streaming and algorithmic experiments such as described in this article.⁶

5. This ‘accumulation’ includes people as well: former FMA founding director Jason Sigal now works as a web developer at Spotify (Sigal n.d.).
6. Notable exceptions are Bottomley (2020) and Eriksson et al. (2018). On early commercial algorithmic experiments, see especially Morris (2015b) and Russo (2018).

At the same time, engineering collaboration in the early stages of a new medium, be that radio broadcasting or algorithmic music, does not in itself constitute a capitalist mode of production. To assume this is to ignore other historical, economic and geographic contexts for such collaborations. Stephen Lovell describes how radio experimenter movements emerged in the socialist Soviet Union. The state co-opted and suppressed collaborative engineering projects to create a wired broadcasting system controlled by Moscow, yet it could never completely suppress pirate radio listening of foreign stations (Lovell 2015). In Mexico, Héctor Beltrán shows, government-sponsored hackathons showcase state power, yet also allow young hackers to ‘make sense of their futures in a precarious state and economy’ (2017: 27). Technical collaboration has predated and exceeded the projects of governments, radio monopolies, music conglomerates and online streaming platforms.

Historical amnesia feeds the corporate narrative of ‘disruption’ and control. ‘We’ve been told’, points out Kenneth Goldsmith, the founder of the open online avant-garde archive UbuWeb, ‘that the internet is now owned by corporate giants and we have pretty much accepted that as true – which is exactly what Facebook and Google want to you think’ (2019). Instead, we could draw on Alessandra Renzi, who extends the Italian autonomist Marxist notion of ‘recomposition’ to oppositional citizen media in Italy from the 1970s to the present. Renzi shows ‘how activist formations recompose around new technologies, needs, and desires, across cycles of struggle’ (Renzi 2020). While individual radical media projects, such as Radio Alice and Teletreet, ended when media and political landscape changed, the long-term radical movement survived, drawing on previous activists’ work and experience. In similar ways, as social institutions, WFMU and FMA ‘recomposed’ collaborative engineering experiments of the early broadcasting era in a new medium. We could thus look at moments of oppositional conviviality in media culture such as the FMA as elements of a continuous struggle.

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