

Dolata, Ulrich

Working Paper

The digital transformation of the music industry. The second decade: From download to streaming

SOI Discussion Paper, No. 2020-04

Provided in Cooperation with:

Institute for Social Sciences, Department of Organizational Sociology and Innovation Studies,
University of Stuttgart

Suggested Citation: Dolata, Ulrich (2020) : The digital transformation of the music industry. The second decade: From download to streaming, SOI Discussion Paper, No. 2020-04, Universität Stuttgart, Institut für Sozialwissenschaften, Abteilung für Organisations- und Innovationssoziologie, Stuttgart

This Version is available at:

<https://hdl.handle.net/10419/225509>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

RESEARCH CONTRIBUTIONS TO ORGANIZATIONAL
SOCIOLOGY AND INNOVATION STUDIES

SOI Discussion Paper 2020-04

The Digital Transformation of the Music Industry

The Second Decade: From Download to Streaming

Ulrich Dolata



University of Stuttgart

Institute for Social Sciences

Organizational Sociology and Innovation Studies

Ulrich Dolata

The Digital Transformation of the Music Industry. The Second Decade: From Download to Streaming.

SOI Discussion Paper 2020-04

University of Stuttgart

Institute for Social Sciences

Department of Organizational Sociology and Innovation Studies

Seidenstr. 36

D-70174 Stuttgart

Editor

Prof. Dr. Ulrich Dolata

Tel.: +49 711 / 685-81001

ulrich.dolata@sowi.uni-stuttgart.de

Managing Editor

PD Dr. Jan-Felix Schrape

Tel.: +49 711 / 685-81004

jan-felix.schrape@sowi.uni-stuttgart.de

Research Contributions to Organizational Sociology and Innovation Studies

Discussion Paper 2020-04 (November 2020)

ISSN 2191-4990

© 2020 by the author(s)

Ulrich Dolata is Professor of Organizational Sociology and Innovation Studies at the University of Stuttgart (Germany).

ulrich.dolata@sowi.uni-stuttgart.de

Additional downloads from the Department of Organizational Sociology and Innovation Studies at the Institute for Social Sciences (University of Stuttgart) are filed under:

<http://www.uni-stuttgart.de/soz/oi/publikationen/>

Abstract

The music industry was the first media sector to be massively affected by digitization and the internet. In this paper, the strongly technology-driven transformation of the sector is first reconstructed, divided into distinguishable development phases and condensed into characteristic peculiarities of an extended socio-technical upheaval. Subsequently, the most recent change in the music market and consumption from buying to accessing music will be examined and the thesis will be pursued that the implementation of streaming gives rise to qualitatively new possibilities and patterns of a technically mediated observation of consumers, curation of music and commodification of the product.

Zusammenfassung

Die Musikindustrie war der erste Mediensektor, der in massiver Weise von Digitalisierung und Internet betroffen war. In diesem Aufsatz wird die stark technikgetriebene Transformation des Sektors zunächst historisch rekonstruiert, in unterscheidbare Entwicklungsphasen eingeteilt und darauf aufbauend zu charakteristischen Eigenheiten eines langgestreckten soziotechnischen Umbruchs verdichtet. Im Anschluss wird der jüngste Wandel des Musikmarktes und -konsums vom Kauf zum Zugang zu Musik in den Blick genommen und die These verfolgt, dass sich mit der Durchsetzung des Streamings qualitativ neue Möglichkeiten und Muster einer technisch vermittelten Beobachtung der Konsumenten, Kuratierung von Musik und Kommodifizierung des Produkts herauschälen.

Content

1	Introduction	5
2	Transformation of the music industry I: Reconstruction	5
3	Transformation of the music industry II: Signatures	9
4	Streaming: From purchase to surveilled and curated access	11
	3.1 The celestial jukebox	12
	3.2 Surveillance	13
	3.3 Curation	14
	3.4 Commodification	16
5	Coda: Abundance and control	17
	References	19

1 Introduction

The music industry was the first media sector to be confronted with digitization—and initially benefited massively from it. The introduction of the compact disc (CD), outstripping the vinyl record in just a few years, initially brought the industry a special boom from the mid-1980s onwards, with significant growth in sales and profits. This boom, which lasted until the late 1990s, ushered in a long period of crisis-ridden transformation that struck the established players largely unprepared, successively realigned the sector's main pillars, and led to massive declines in both sales and profits. The easy replicability of the new digital audio medium as well as new data compression standards such as MP3 and the internet, as complementary technical innovations, initially enabled an enormous upswing in non-commercial file sharing via music file-sharing networks such as Napster from the early 2000s onwards. The sale of physical audio media via brick-and-mortar and e-commerce was now supplemented by downloads, which were sold by new digital music retailers such as Apple, in particular, and its iTunes Store. This interim period, which was rather short in retrospect, changed mainly the distribution of purchasable music. However, the subsequent technical facilitation and rapid social implementation of streaming music, which gained momentum from the mid-2010s onwards, went much further. Since then, the purchase of music has declined sharply, being increasingly replaced by subscription and advertising-financed access to music via platforms such as Spotify.

In this paper, the strongly technology-driven transformation of the music sector will first be reconstructed, divided into distinguishable developmental phases and condensed into characteristic features of an extended socio-technical upheaval. Subsequently, the recent transformation of the music market and music consumption, namely from purchasing to accessing music, will be examined. The overall thesis of my argumentation is that the implementation of streaming gives rise to qualitatively new possibilities and patterns of a technically mediated surveillance of consumers, curation of music and commodification of the product.

2 Transformation of the music industry I: Reconstruction

I begin with a recapitulation of this long transition period, which is still ongoing today. At the center of the analysis is the interplay between consistently strong technological innovation dynamics, serious socioeconomic restructuring, and substantial changes in the patterns of music use (see Dolata 2008, 2011, 2013; Burkart and McCourt 2006; Tschmuck 2006; Wikström 2009; Morris 2015; Eriksson et al. 2019).

The *first phase (1983 to 1999)* of this transition was characterized above all by the digitization of the audio medium and is an example of the fact that even radical technical

innovations need not necessarily trigger disruptive socioeconomic restructuring processes in an established economic sector. The new sound carrier technology was initially what Christensen (1997: xviii) describes as sustaining technology. As a radical innovation, the CD brought new growth dynamics to the sector while nevertheless allowing, by and large, for integration into the established markets, the production, marketing and distribution models, as well as the copyright and contractual frameworks. Indeed, the switch from vinyl to CD and the resulting possibility of further exploitation of the record companies' back catalogs led to a tripling of global sales of audio media between 1985 and 1995—the whole without the so-called majors, in other words, the major music groups Universal/Polygram, Sony Music Entertainment, EMI, Warner Music and Bertelsmann Music, which accounted for over 80 percent of global sales in the mid-1990s, having to reinvent themselves or fear new competition. For the music companies, the CD was initially nothing more than a very profitable replacement of the record with a new digital albeit still physical audio medium.

This configuration, which was quite favorable to the music industry, at least in the beginning, proved deceptive as early as the second half of the 1990s. At that point, the entire music repertoire had been made available in digital format. Yet, in contrast to the DVDs that were introduced later, CDs had no copyright protection. On this basis, the introduction of CD recorders and recordable CDs in the second half of the decade made it possible to burn digital copies of physical audio media without any loss of quality or restrictions. In addition, the increasing spread of data compression software such as MP3, together with the connection of computers via peer-to-peer technologies (P2P) from the second half of the decade onwards, opened up the possibility of sharing music on the internet without any problems. The *second phase (1999 to 2003)* of the transition was characterized by a boom in free music file-sharing forums on the internet, marked most notably by the rise of Napster. Instead of having to purchase music in order to listen to and copy it, users were now able to access it freely on the internet in a digital format that could just as readily be downloaded as it could be deleted. This led to a considerable loss of control by the music industry over its product and the transformation process as a whole.

After the failure of all attempts by the industry to get a grip on non-commercial exchange through legal action against file-sharing networks and via the development of company-owned commercial download offers, the *third phase (2003 to 2013)* saw a breakthrough in the commercial sale and distribution of downloads, which was initiated by an actor from outside the industry. Apple first opened its iTunes Store in the United States in 2003, boasting nearly the complete digitally available repertoire of the majors and many independent labels. Together with the music player iPod, Apple was able to present an integrated commercial download and hardware offering that was well received by consumers and which the music companies, that had been steadily losing ground, had no choice but to accept. The success of iTunes and the establishment

of further commercial download retailers was basically an extension of the old distribution model on a digital basis. The classic brick-and-mortar retailers were expanded to include new online stores that enjoyed access to the music companies' available repertoire. In this way, the music companies had lost sway over the value chain and the transformation process but nevertheless remained key players as central producers and rights holders.

Table 1: Global Recorded Music Industry Revenues 2001 to 2019 (in billion US\$)

Year	Total Revenue (in billion US-\$)	Of that (in %)				
		Physical	Downloads and other digital	Streaming	Performance Rights	Synchroni- zation
2001	23.4	97.8	-	-	2.2	-
2002	21.9	96.8	-	-	3.2	-
2003	20.4	96.1	-	-	3.9	-
2004	20.3	93.6	2.0	-	4.4	-
2005	19.8	89.9	5.1	0.5	4.5	-
2006	19.2	83.9	10.4	0.5	5.2	-
2007	18.0	77.8	15.0	1.1	6.1	-
2008	16.7	70.7	20.4	1.8	7.1	-
2009	15.6	65.4	23.7	2.6	8.3	-
2010	14.8	60.1	26.4	2.7	9.4	1.4
2011	14.7	55.1	28.6	4.8	9.5	2.0
2012	14.7	51.0	29.9	6.8	10.3	2.0
2013	14.4	46.5	29.9	9.7	11.8	2.1
2014	14.0	42.1	28.6	13.6	13.6	2.1
2015	14.5	39.3	25.5	19.3	13.1	2.8
2016	15.8	34.8	20.3	29.1	13.3	2.5
2017	17.0	30.6	15.3	38.2	13.5	2.4
2018	18.7	24.6	9.6	49.2	13.9	2.7
2019	20.2	21.3	6.9	56.4	12.9	2.5

Source: Source: IFPI 2020, 13. Own calculations.

Despite such progress, the music industry was in a deep and persistent economic crisis between 2001 and 2013, with the global revenues of the music companies plummeting during this period from 23.4 to 14.4 billion US\$. Although the share of downloads in the music industry's total sales rose during this period, that increase was at no time

able to compensate for the simultaneous sharp drop in CD sales (Table 1). This precarious situation can also be attributed to the fact that efforts to significantly curb free music exchange and consumption on the internet, either by breaking up Napster and other subversive file-sharing networks or by establishing commercial download stores, had failed. Another contributing factor was the immense upswing of the media platform YouTube, acquired in 2006 by Google. In the second half of the 2000s, YouTube, which generates its revenues almost exclusively through advertising, emerged as a legal, freely usable and strongly frequented offer that made the compilation, exchange and nearly unlimited search and listening of music on the internet largely free of restrictions (Burgess and Green 2018).

The prospect of overcoming the long industry crisis was not in sight until the *fourth phase (since 2013)*, which is characterized by the rapid upturn in commercial music streaming and the associated transition from purchasing music to paid access to music. The technical foundations for this are the increasingly widespread rollout of broadband internet access with high data transfer rates and high transmission speeds; the exponentially growing storage capacities for data-intensive media products, offered by cloud platforms such as Amazon Web Services or Google Cloud; and rapid advances in the processing, structuring and algorithmic control of large volumes of data.

The streaming service Spotify, founded in 2006 and initially conceived as a legal alternative to non-commercial file-sharing services such as The Pirate Bay, became the nucleus of this renewed reorientation of the music market and consumption over the course of the 2010s and developed an enormous dynamic in the second half of the decade (Eriksson et al. 2019: 31–67). Unlimited, mostly subscription-based access to music had replaced both the then-dominant consumption pattern and the industry's most significant revenue driver in only a few years. In 2019, more than half of the music companies' global revenues were already derived from streaming offers, only 7 percent from downloads and just over 20 percent from physical audio media. It is also thanks to the streaming boom that the music industry's revenues have been rising again since the mid-2010s, gradually approaching the pre-crisis level of the late 1990s (Tab. 1). In addition to Spotify, which in 2019 had a global market share of 36 percent in music streaming, this rapidly growing market is characterized by Apple Music (18 percent), Amazon Music (13 percent) and the leading Chinese music platform Tencent Music Entertainment (10 percent), linked to Spotify via a mutual equity investment since the end of 2017 (Statista 2020: 21).

3 Transformation of the music industry II: Signatures

What are the overarching characteristics of the outlined transformation of the music industry? In the following, I will highlight three essential markers of the transformation.

First, it is a primarily technology-driven process of socioeconomic change, characterized by a cluster of disruptive technologies that are being enhanced and refined in rapid succession— digitization, (mobile) internet, data compression and processing, P2P technologies, cloud computing, machine learning, and algorithmic selection and control programs. All these technologies did no longer fit into the sector's up-to-then stable and long-lived socioeconomic structure. They form the basis of those serious changes in the organizational, structural and institutional framework of the music business that have since been driven primarily by new players and have led to a considerable loss of influence by the established ones.

The digital technologies and infrastructures have greatly changed the music business as well as the commercial and non-commercial access and sharing possibilities of music listeners. The recording and production of music has decoupled itself from the music industry's company-owned recording studios and can easily be organized decentrally and independently by the artists themselves. Music is no longer distributed via distribution systems controlled by the majors and their closely associated brick-and-mortar stores but primarily via internet retailers and cloud-based streaming portals. Their commercial value has shifted from purchased physical or digital products to a for-fee temporary access to the entire repertoire. In view of these changes, the legal parameters of the music business, such as copyright, intellectual property rights, contractual rights and exploitation rights, which had been geared to the physical recording business until the 2000s, likewise had to be fundamentally renegotiated and tailored to the digital business. In addition, not only the paid access to music but also the possibilities of listening to, discovering, recommending and exchanging music without paying for it have expanded and differentiated greatly over the past two decades—initially primarily due to the emergence of subversive music file-sharing networks on the internet and today mainly through media platforms such as YouTube or social networks like Facebook (Burkart 2014; Burgess and Green 2018; Nicholson 2019).

The *second* characteristic of the music industry's upheaval is that it takes the form of an elongated period of transformation that began in the late 1990s with the near-ubiquitous roll-out of the internet and the emergence of music file-sharing networks, the end of which is still not foreseeable even twenty years later. This is primarily due to the continuing high level of technological innovation dynamics, accompanied by a permanent and gradual socioeconomic change that has affected all of the sector's essential pillars: the product itself, the markets and business models, the forms of organizing, the configurations of actors, the institutional framework and the consumer behavior.

This is not untypical of major socio-technical transformations, which, rather than leading to a new period of consolidated continuity within a short period of time, regularly take the form of longer, often volatile restructuring processes spanning one, two or even three decades. In the economic literature on innovations, such extended periods of upheaval have long since been referred to as periods of mismatch (Freeman and Perez 1988) or periods of considerable confusion (Henderson and Clark 1990), in which the previously functioning match between technology, socioeconomic structures and institutions is out of step and in need of substantial readjustment. Such periods are characterized by the continuous search for, experimentation with and interested debate on the possible uses of new technologies and the organizational patterns, market structures and institutional arrangements that fit them. I myself have described this multi-step and protracted process elsewhere as gradual transformation (Dolata 2013a: 94–120). In this context, “transformation” refers to an in the end radical reorientation that substantially changes a sector’s technological basis and, concomitantly, its socioeconomic structures. “Gradual” emphasizes the essential procedural characteristics of such periods of transformation that take place as an accumulation of numerous transformation activities which extend over a longer period of time. The music industry is a prime example of this type of permanent transformation that puts all of the actors involved under constant pressure to adapt and readjust.

A *third* characteristic of the sectoral transformation is that in all phases it received its essential transformative impetus from new actors who had previously played no role in the music industry. In the early days, these were primarily the operators of subversive music file-sharing networks (such as Napster, Gnutella or later Pirate Bay) as well as young filesharers with an affinity for the internet, who began playing with the new technical possibilities in the late 1990s, initially without any decided commercial intentions. The commercial consolidation and institutionalization of the new technological possibilities regularly took place via established actors from outside the sector (such as Apple with its iTunes Store and Google with its media and advertising platform YouTube) or via newly founded start-up companies (such as Spotify). These “parties from the fringes of an interorganizational field” (Leblebici et al. 1991: 358) did not base their actions on the existing technologies, structures and institutional framework conditions of the sector, which they ignored, but were characterized by a high degree of sensitivity and receptiveness to the new technological possibilities. This enabled them to become the main drivers of sectoral change.

By contrast, the majors and industrial interest groups, which had long been able to control and shape the sector with hardly any interruption, systematically underestimated the potential explosive power of the new technologies in the first decade of the transition, perceived them primarily as a danger to be fought, and only began to strategically reposition themselves on a larger scale when faced with massive and unavoidable pressure to restructure. This kind of inadaptability on the part of established

actors is by no means exceptional for major periods of mismatch and has been described in the literature as path dependency or cognitive and structural inertia of saturated organizations (e.g., Beyer 2006; Hannan and Freeman 1977, 1984; Dolata 2013a). Due to this, the music industry's sectoral transformation has not, especially in its first decade, taken place as a process of coordinated restructuring supported and channeled by the industry but rather as a crisis-ridden readjustment accompanied by a considerable loss of control on the part of the established actors.

Of course, the overall picture has to consider that the established actors, especially the majors, did not become obsolete over the course of the transformation and have not been simply replaced by new actors. Rather, although confronted with massive pressure to adapt and losing their unchallenged supremacy, they have been able to remain influential players in the sector's configuration of actors. They began to proactively adapt to the new conditions in 2007–2008 and, as producers, marketers, rights holders and licensors, continue to be major players in the renewed music business. In 2018, the remaining three majors Universal Music Group, Sony Music Entertainment and Warner Music Group still accounted for nearly 70% of all revenues generated by physical and digital music sales in the Western world (Statista 2020a: 28). We are therefore not facing a radical exchange of players but a differentiation of the configuration of actors that has been accompanied by a rearrangement of the power relations within the industry.

4 Streaming: From purchase to surveilled and curated access

I will now examine a *fourth* signature of the upheaval in more detail: The strong and paradigmatic transition from purchasing to unlimited access to music—a trend already intimated with the emergence of subversive file-sharing networks from the late 1990s onwards and which became concrete as a commercial offer with the boom in music streaming in the latter 2010s.

Access to music that is not tied to purchase has existed for a long time, especially in the form of radio, complemented in the 1980s by music TV stations such as MTV, which were popular at the time. The repertoire of such stations was pre-selected and curated primarily by disc jockeys and, apart from specialized niche offers for music lovers, concentrated strongly on top hit playlists, which catered to the musical taste of the masses, helped radio stations in reaching their audience, and supplied the music companies with the few chartbusters that have always generated the majority of their sales and profits. In these formats, access to music remained, of course, limited to what the radio stations or music television selected and played at a given time (Fornatale and Mills 1980; Crisell 2002).

3.1 The celestial jukebox

The, in retrospect, brief boom of P2P music file-sharing networks on the internet radically opened up these boundaries for the first time. They offered music listeners the new possibility of anonymous and decentralized, free and non-time-bound access as well as of discovering and sharing larger music repertoires—giving rise, in the early 2000s, to the vision of a so-called celestial jukebox: “This heavenly jukebox, as it is sometimes called, will hold the contents of every record store in the world, all of it instantly accessible from any desktop” (Mann 2000; Goldstein 2003).

The new possibility of unrestricted access and exchange of music via P2P networks was immediately branded as illegal piracy by the industry and fought with all (legal) means at its disposal. The alternative commercial offer preferred by the industry, namely the purchase of music titles (especially downloads) in legal online music stores such as iTunes, was an attempt to contain this dissolution of boundaries in the hope of regaining at least a minimum of control over the music business and the idiosyncratic activities of music listeners. Although the commercial online music stores also offered almost the entire repertoire of available music, they ceased to have anything in common with the utopian ideas of a celestial jukebox. At the time, Burkart and McCourt (2006: 4f.) aptly described this situation as follows: “Instead of a gateway into an utopian garden of cultural abundance, the Celestial Jukebox has become a tollbooth into a web of privately owned and operated networks where traffic in intellectual property is carefully monitored and controlled, a walled garden of closed networks with restricted access and tightly circumscribed activities.”

With the emergence and rapid growth of music streaming services in the 2010s, the promise of unlimited access to music was renewed and, in a second attempt, even prevailed—albeit now, of course, in the form of legal and commercial offerings that were supported by the music industry and that have since become its main source of revenue. In this context, the vision of the celestial jukebox was updated and adapted to commercial streaming platforms. Pollack (2010, 2011), for example, wrote shortly after the founding of Spotify in the magazine *Wired*: “It is exactly what music fans had been waiting for, fulfilling the long-sought dream of a ‘celestial jukebox’—a service that makes every song always available, freely and legally.”

In the form of streaming services, however, the jukebox is no longer a decentralized, anonymous and non-commercial project but is designed, set up, operated and controlled by companies. This has a number of very tangible consequences. Unrestricted access to the repertoire is only possible through registration and payment and, in what is the dark side of not owning, devolves into a fleeting happiness if the subscription is not renewed or the service is discontinued. In their behavior on commercial platforms, users are bound both to the terms and conditions of the operators, which they have to accept as social rules, and to technical pre-structuring such as interfaces, features or

algorithmic sorting techniques, which they have to accept and by which their listening habits are more or less specifically influenced. Everything they do there—browsing, recommending, exchanging, creating their own playlists or listening to pre-structured playlist offerings—is comprehensively observed by the platform operators, condensed into personalized data sets, reflected back into individual music consumption (e.g., in the form of recommendations), and evaluated for commercial purposes (Burkart 2014; Morris and Powers 2015; Wikström 2015; Sun 2019).

In other words, the promise of the celestial jukebox, understood as the truly heavenly seduction of unlimited access to the entire music repertoire at any time and any place, can only be fulfilled at the price of paid admission, the seamless surveillance of music consumption, the targeted curation of listening habits and the economic exploitation of user behavior (Dolata 2020).

In the following, I will illustrate and explain this primarily with the example of Spotify. With 299 million active users per month, 138 million subscribers and over 60 million music titles on offer (cut-off date: June 30, 2020; Spotify 2020: 26), the Swedish company currently operates the most-used streaming service in the Western world and raised nearly €6.8 billion in revenues in 2019, 90% of which were generated by subscriptions to premium access and the remaining 10% through advertising from free accounts. In 2014, Spotify acquired the Echo Nest platform, whose know-how has contributed significantly to the professionalization of Spotify's curated playlists and recommendations. Since 2018, Spotify also acquired the start-up companies Anchor FM, Cimlet Media and Cutler Media with the aim of developing audio podcasts as a new business segment alongside music streaming (Spotify 2020a). Although the company did not make a profit in 2019 and the first two quarters of 2020, it is now one of the major players in the music industry, both in terms of revenues and its central role in the digital music business.

3.2 Surveillance

The business of streaming services such as Spotify is based on the seamless and increasingly precise observation, evaluation and prediction of individual user behavior, which has become possible due to the enormous progress in digital surveillance technologies in the 2010s (Lyon 2018). Not only the search for artists or pieces of music, the playing, cancelling or skipping of songs, the creation of individual playlists and the adding or deleting of titles including date and time are automatically recorded. In addition, the platforms' collection of personal user data includes which playlists are listened to when and where, what is listened to at what times, and who exchanges information with whom. The collected and aggregated data go far beyond the creation of rather static profiles of individual users with comparatively stable characteristics (such as their basic music preferences). By increasingly including situational factors

such as time of day, activity, location and environment in the data collection, it is now possible to create much more specific and context-related individual profiles that can be used, for example, to capture a user's various moods and music preferences at different times of the day or at different places. With all this, individual "data doubles" are created as a "reified, datafied version of the self" (Drott 2018: 245), which not only track and map the activities and preferences of platform users over time but also form the basis for predicting future user behavior. All this is far removed from classic and rough group ascriptions of musical taste along broad categories such as age, gender, class or ethnicity, which radio stations have traditionally been using to design their programs, or music companies to structure their offerings.

Of course, data-based surveillance, evaluation and prediction of individual user behavior is not a unique selling point of music streaming platforms but constitutive for social media and the internet economy as a whole (Zuboff 2019). However, the density and quality of the surveillance possible on music streaming services differs from other platforms in two respects. On the one hand, musical taste has always been a strong form of expression of the listeners' attitudes, feelings and moods. This allows for comparatively intimate insights into their personality. On the other hand, music streaming services, similar to radio or social media platforms such as Facebook, Instagram and WhatsApp, accompany users throughout the day and have become part of their daily routine—in contrast to film streaming platforms such as Netflix, for example, which are accessed in a much more targeted and situation-specific manner. This enables not only temporary and selective but continuous observation, recording and evaluation of individual user behavior (Drott 2018).

3.3 Curation

Continuous surveillance, in turn, forms the basis for new possibilities of curating music, which on streaming platforms are expressed above all in the compilation of playlists and listening recommendations—offerings in which the overwhelming range of music titles is pre-structured, tailored to personal preferences and, in the case of free access use, accompanied by personalized advertising.

The phenomenon itself is anything but new. Radio has always done pre-selections and intervened curatorially in the music listening experience, for example, through the picks of DJs, the promotion of genre-specific music formats, the playing of selected playlists or the selective honoring of listeners' wishes (Douglas 2004). In addition, record companies (especially with their Artist & Repertoire departments) and music magazines also did much to define genres, promote selected musicians, influence musical taste, shape specific listener communities, contextualize music and charge it with socio-cultural meaning (Sun 2019).

Even for streaming services such as Spotify, pre-selected and prepared music offerings are now constitutive and ubiquitous. In addition to personalized music recommendations, the few one-to-many playlists such as Today's Top Hits, RapCaviar, Viva Latino! or New Music Friday, which are in high demand, as well as mood-oriented compilations (for waking up, the workplace, romance, parties or chilling out) shape the listening habits of the users and the revenue structures of the licensing music companies.

This was not so in the beginning. Spotify started out as a search engine that allowed users to enter keywords to find the music they wanted to hear, whereby they clearly needed to know what they wanted to hear. The pure search function was later supplemented by algorithmically based tools that enabled automated and personalized recommendations based on observed listening habits, representing a stronger structuring of the music listeners' horizon of discovery. From 2013 onwards, what is known in the literature as the curatorial turn took place and—supported by the acquisitions of Tunigo, a start-up company specializing in playlist creation, and the aforementioned technology platform The Echo Nest—shifted the focus within a short time from the open search for artists or titles to offering ready-made playlists for every occasion and mood (Eriksson et al. 2019: 115–137; Morris 2015a).

If you look at the countless playlists that can be found on Spotify, you will notice first of all (similar to app stores, for example) an extreme concentration on only a few offers. Today's Top Hits, Top 50 Global and Rap Caviar lead the list of the biggest playlists with 26, 15 and 13 million followers respectively (Spotify.com; Spotontrack.com; accessed on August 4, 2020). After place 25, the reach of the playlists drops significantly. The nearly 7.4 million playlists following the Top 1000—mainly user compilations—receive hardly any attention at all, especially its very long tail end.

Secondly, the playlists that are particularly in demand on Spotify are compiled by Spotify itself, followed by playlists created by the three major music groups via their subsidiaries Filtr (Sony Music), Digster (Universal Music) and Topsify (Warner Music). This means that Spotify clearly dominates its playlists.

Thirdly, apart from exceptions such as the Top 50 playlists, which are automatically generated according to the number of streams, the large playlists are not created algorithmically but mostly manually by employees of Spotify or external playlist providers. In other words, playlist curation, unlike fully automated recommendations, remains a primarily manual activity, which is, of course, carried out with the inclusion of all the digital data traces provided by the users and prepared by the providers.

Fourthly, and finally, with its large playlists, Spotify has a significant influence on the music taste and listening behavior of the users as well as the (in-)visibility of the artists and the sales of the music companies. Datta et al. (2018) have found that premade playlists expand users' listening habits to a larger selection of artists, music titles and

genres while decreasing their level of concentration when listening. Aguiar and Wald-fogel (2018) have shown that music titles that appear in the major playlists generate a large number of additional streams. For example, the mere fact of making it into the Today's Top Hits or the New Music Friday playlists will provide artists with several million additional streams for that track.

A paradox is unmistakable: While all music is now accessible at any time and any place—an El Dorado for music lovers—it is, at the same time, narrowed down again by automated recommendations and curated playlists for the vast majority of fleeting everyday listeners (who want this reduction in complexity) and tailored to pre-structured and context-sensitive listening experiences for every occasion (Chodos 2019). Morris and Powers (2015: 106) have characterized this as a trend towards branded musical experiences “which appear to offer fluid and abundant musical content but, in reality, create circumscribed tiers of content access for a variety of scenarios, users and listening environments.”

3.4 Commodification

This development has significantly changed the revenue structures of the music business. The purchase of individual music titles or albums, which was still typical for the download stores of the 2000s, has shifted to subscriptions that provide access to the entire repertoire, supplemented by income from accompanying advertising. The latter is employed by Spotify and other streaming services primarily to pursue the goal of winning users of their free offer for a paid premium account without advertising interruptions. For the music companies, which are essentially remunerated according to the number of streams of their music titles, this revenue model has developed into a profitable business.

What is more interesting than these obvious shifts in the revenue structures of the industry, however, is that streaming has opened up new possibilities and forms of the commodification of music, which affect both changes in the commodity form of the product itself and enhanced possibilities of an exploitation of the music-loving audience as integral part of the commodity.

The former is directly related to the curating activities of the streaming platforms just described. While classic retailers and download retailers of the 2000s still advertised and sold music as a finished product, streaming services such as Spotify are significantly changing the commodity form of music yet again before releasing it for consumption. These services do not simply deliver music but rather recombine and bundle the raw material they acquire from the music companies into curated playlists and listening packages that are tailored to the specific life worlds of their individual listeners. The dominant format in which the commodity music is now offered is no longer

the music title or album, which stand on its own, but the arranged soundtrack for every occasion and mood. Streaming platforms are thus no longer merely retailers or intermediaries who organize distribution but rather manufacturers: they perform productive and value-adding work through which they actively and substantially change the commodity character of music (Fleischer 2017).

The one main raw material they work with is what the music companies provide them with. The other raw material, which is indispensable for their productive work, is what the users provide them with in the form of exploitable data tracks, virtually in passing, through their numerous activities and expressions of life on the platform. The second and complementary level of productive work performed by the streaming companies is the technically complex and presuppositional evaluation and aggregation of this user data, on the basis of which they can tailor the musical material available to them to individual and situational listening preferences in the first place. The economic exploitation of user behavior, which is recorded with increasing precision in the processed data tracks, becomes concrete in the form of personalized advertising and marketing strategies (Vonderau 2019: 9–14), but manifests above all in the refinement and quality improvement of the platform-specific information, search, recommendation and curation services that form the central basis of the streaming business and that serve as an essential selling point setting providers apart from each other in the competition.

Streaming platforms thus serve as an example of the now ubiquitous tendency of a comprehensive commodification of individual behavior. Zuboff (2019) has described this as a core element of surveillance capitalism and Voß as a new capitalist land grab: as “expansion of profit-based economies by accessing areas that are not (or not completely) capitalistically oriented” (Voß 2020: 106, my translation). This expansion of commercializable societal areas has now also encompassed everyday life in all its facets. The users themselves make a significant contribution to this with all their observable activities on the platforms. Contrary to what is often emphasized, however, this does not take place in the form of unpaid work (e.g., Hardy 2014: 136–156 or Voß 2020: 89) but rather—much more trivially—the all too voluntary disclosure of their leisure time behavior, which only acquires economic value and can be transformed into a commercially exploitable form through the productive work of the companies described above.

5 Coda: Abundance and control

Over the past two decades, the music industry and music consumption have changed radically. These changes have unfolded successively in a multi-step transformation process that has been largely driven by the implementation of new technological possibilities and shaped by the activities of new social actors. With the rapid implementation of

commercial streaming, which marks far more than just a transition from purchase to (paid) access, the music business underwent another substantial transformation in the second half of the 2010s. The salient feature of this most recent transformation is a re-adjustment of the relationship between abundance and control.

The unbounded and seemingly open listening experience that streaming platforms offer to consumers corresponds to a technically highly mediated renewal and expansion of control options which both the streaming platforms and the music companies now have over the product, the markets and the users they serve. The product is only borrowed (for a fee or with advertising) and remains in the possession of the companies, as do all the data tracks and the more or less creative own contributions made by the users of the platforms. The surveillance data collected and evaluated by the platforms and the companies allow for a much more precise analysis of the music markets, whereby the latter can be influenced and curated in a much more targeted manner. Further, the music listeners themselves cease to be an abstract and only roughly circumscribed collective but are, through the rapid progress of digital surveillance technologies, becoming tangible as individuals with distinct personality traits and whose personal preferences, passions and social activities can be uncovered ever more precisely and fed into the production and exploitation process of music in an ever more targeted manner.

The loss of control that had attained alarming proportions for the music industry, especially in the phase of anonymous and unrestricted file sharing via P2P networks, has been more than compensated for by commercial streaming platforms with their surveillance, curation and commodification activities. In this way, the music industry once again finds itself in a comfortable and favorable situation.

References

- Aguiar, Luis, and Joel Waldfogel. 2018. *Platforms, Promotion, and Product Discovery. Evidence from Spotify Playlists*. Working Paper 24713. Cambridge MA: National Bureau of Economic Research.
- Beyer, Jürgen. 2006. *Pfadabhängigkeit. Über institutionelle Kontinuität, anfällige Stabilität und fundamentalen Wandel*. Frankfurt / New York: Campus.
- Burgess, Jean, and Joshua Green. 2018 (2nd Ed.). *YouTube. Online Video and Participatory Culture*. Cambridge / Medford: Polity.
- Burkart, Patrick, and Tom McCourt. 2006. *Digital Music Wars. Ownership and Control of the Celestial Jukebox*. Oxford: Rowman & Littlefield.
- Burkart, Patrick. 2014. Music in the cloud and the digital sublime. *Popular Music and Society* 37(4), 393–407.
- Chodos, Asher Tobin. 2019. What does music mean to Spotify? An essay on musical significance in the era of digital curation. *INSAM Journal of Contemporary Music, Art and Technology* 1(2), 36–64.
- Christensen, Clayton M. 1997. *The Innovator's Dilemma*. Harvard: Harvard Business School Press.
- Crisell, Andrew. 2002. Radio: Public Service, Commercialism and the Paradox of Choice. In: Briggs, Adam and Paul Copley (Eds.), *The Media. An Introduction*. 2nd Ed. Harlow: Longman, 121–134.
- Datta, Hannes, George Knox, and Bart Bronnenberg. 2018. Changing their tune: How consumers' adoption of online streaming affects music consumption and discovery. *Marketing Science* 37(1), 5–21.
- Dolata, Ulrich. 2008. Das Internet und die Transformation der Musikindustrie. Rekonstruktion und Erklärung eines unkontrollierten sektoralen Wandels. *Berliner Journal für Soziologie* 18(3), 344–369.
- Dolata, Ulrich. 2011. *The Music Industry and the Internet. A Decade of Disruptive and Uncontrolled Sectoral Change*. SOI Discussion Paper 2011-02. Stuttgart: University of Stuttgart.
- Dolata, Ulrich. 2013. Krise und Transformation der Musikindustrie. In: Dolata, Ulrich, and Felix Schrape (Eds.), *Internet, Mobile Devices und die Transformation der Medien. Radikaler Wandel als schrittweise Rekonfiguration*. Berlin: Edition Sigma, 67–91.
- Dolata, Ulrich. 2013a. *The Transformative Capacity of New Technologies. A Theory of Sociotechnical Change*. London: Routledge.
- Dolata, Ulrich. 2020. Internet – Platforms – Regulation. Coordination of markets and curation of sociality. SOI Discussion Paper 2020-02. Stuttgart: University of Stuttgart.
- Douglas, Susan S. 2004. *Listening in: Radio and the American Imagination*. Minneapolis: University of Minnesota Press.
- Drott, Eric A. 2018. Music as a technology of surveillance. *Journal of the Society for American Music* 12(3), 233–267.
- Eriksson, Maria, Rasmus Fleischer, Anna Johansson, Pelle Snickars, and Patrick Vonderau. 2019. *Spotify Teardown. Inside the Black Box of Streaming Music*. Cambridge / London: MIT Press.
- Fleischer, Rasmus. 2017. If the song has no price, is it still a commodity? Rethinking the commodification of digital music. *Culture Unbound* 9(2), 146–162.
- Fornatale, Pete, and Joshua E. Mills. 1980. *Radio in the Television Age*. Woodstock, N.Y.: Overlook.
- Freeman, Christopher, and Carlota Perez. 1988. Structural crises of adjustment, business cycles and investment behaviour. In: Dosi, Giovanni et al. (Eds.): *Technical Change and Economic Theory*. London / New York: Pinter, 38–66.
- Goldstein, Paul. 2003. *Copyright's Highway: From Gutenberg to the Celestial Jukebox*. Stanford: Stanford University Press.
- Hannan, Michael T., and John Freeman. 1977. The population ecology of organizations. *American Journal of Sociology* 83, 929–964.

- Hannan, Michael T., and John Freeman. 1984. Structural inertia and organizational change. *American Sociological Review* 49, 149–164.
- Hardy, Jonathan. 2014. *Critical Political Economy of the Media. An Introduction*. London / New York: Routledge.
- Henderson, Rebecca, Kim B. Clark. 1990. Architectural innovation: The reconfiguration of existing product technologies and the failure of existing firms. *Administrative Science Quarterly* 35(1), 9–30.
- IFPI. 2020. *Global Music Report. The Industry in 2019*. London: IFPI,
- Leblebici, Huseyin, Gerald R. Salancik, Anne Copay, and Tom King. 1991. Institutional change and the transformation of interorganizational fields: An organizational history of the U.S. radio broadcasting industry. *Administrative Science Quarterly* 36(3), 333–363.
- Lyon, David. 2018. *The Culture of Surveillance*. Cambridge UK: Polity.
- Mann, Charles C. 2000. The heavenly jukebox. *The Atlantic*. September (<https://www.theatlantic.com/past/docs/issues/2000/09/mann.htm>).
- Morris, Jeremy Wade, and Devon Powers. 2015. Control, curation and musical experience in streaming music services. *Creative Industries Journal* 8(2), 106–122.
- Morris, Jeremy Wade. 2015. *Selling Digital Music, Formatting Culture*. Oakland: University of California Press.
- Morris, Jeremy Wade. 2015a. Curation by code: Infomediaries and the data mining of taste. *European Journal of Cultural Studies* 18(4), 446–463.
- Nicholson, Robyn. 2019. Saviours or burdens? The effects of streaming services on the music industry. *Dalhousie Journal of Interdisciplinary Management* 15, 1–15.
- Pollack, Neal. 2010. Spotify is the coolest music service you can't use. *Wired*, Dec. 27, 2010.
- Pollack, Neal. 2011. Spotify's celestial jukebox. *Wired*, Jan. 7, 2011.
- Spotify. 2020. *Quarterly Results Q2 2020*. Form 6-K. Washington, D.C.: United States Securities and Exchange Commission.
- Spotify. 2020a. *Annual Report 2019*. Form 20-F. Washington, D.C.: United States Securities and Exchange Commission.
- Statista 2020. *Musikstreaming*. Hamburg: Statista.
- Statista 2020a. *Musikindustrie*. Hamburg: Statista.
- Sun, Hyojung. 2019. Paradox of celestial jukebox: Resurgence of market control. *Creative Industries Journal* 12(1), 105–124.
- Tschmuck, Peter. 2006. *Creativity and Innovation in the Music Industry*. Springer: Dordrecht.
- Vonderau, Patrick. 2019. The Spotify effect: Digital distribution and financial growth. *Television & New Media* 20(1), 3–19.
- Voß, Günter G. 2020. *Der arbeitende Nutzer. Über den Rohstoff des Überwachungskapitalismus*. Frankfurt / New York: Campus.
- Wikström, Patrick. 2009. *The Music Industry*. Cambridge UK: Polity Press.
- Wikström, Patrick. 2015. Will algorithmic playlist curation be the end of music stardom? *Journal of Business Anthropology* 4(2), 278–284.
- Zuboff, Shoshana. 2019. *The Age of Surveillance Capitalism*. New York: Hachette.

Further Publications

Research Contributions to Organizational Sociology and Innovation Studies

Schreyer, Jasmin, 2020: *Sharing ≠ Sharing Economy. Ausprägungen der digitalen Sharing Economy im Lebensmittelsektor*. SOI Discussion Paper 2020-03.

Dolata, Ulrich, 2020: *Internet – Platforms – Regulation. Coordination of Markets and Curation of Sociality*. SOI Discussion Paper 2020-02.

Dolata, Ulrich, 2020: *Internet – Plattformen – Regulierung. Koordination von Märkten und Kuratierung von Sozialität*. SOI Discussion Paper 2020-01.

Schrabe, Jan-Felix, 2019: *Technology and the Promise of Decentralization*. SOI Discussion Paper 2019-01.

Dolata, Ulrich, 2018: *Privatisierung, Kuratierung, Kommodifizierung. Kommerzielle Plattformen im Internet*. SOI Discussion Paper 2018-04.

Fettke, Ulrike, 2018: *Etablierte und Außenseiter in der Kommunalpolitik?* SOI Discussion Paper 2018-03.

Kropp, Cordula, 2018: *Sustainable Innovations. Theories, Conflicts and Strategies*. SOI Discussion Paper 2018-02.

Dolata, Ulrich, 2018: *Technological Innovations and the Transformation of Economic Sectors. A Concise Overview of Issues and Concepts*. SOI Discussion Paper 2018-01.

Neukirch, Mario, 2017: *Die Dynamik des Konflikts um den Stromtrassenbau*. SOI Discussion Paper 2017-04.

Schrabe, Jan-Felix, 2017: *Open Source Projects as Incubators of Innovation*. SOI Discussion Paper 2017-03.

Dolata, Ulrich, 2017: *Social Movements and the Internet. The Sociotechnical Constitution of Collective Action*. SOI Discussion Paper 2017-02.

Dolata, Ulrich, 2017: *Apple, Amazon, Google, Facebook, Microsoft. Market Concentration – Competition – Innovation Strategies*. SOI Discussion Paper 2017-01.

Kungl, Gregor / Geels, Frank W., 2016: *The Destabilisation of the German Electricity Industry (1998-2015)*. SOI Discussion Paper 2016-02.

Schrabe, Jan-Felix, 2016: *Social Media, Mass Media and the 'Public Sphere'*. SOI Discussion Paper 2016-01.

Schrabe, Jan-Felix, 2015: *Open Source Softwareprojekte zwischen Passion und Kalkül*. SOI Discussion Paper 2015-02.

Radig, Ann-Kathrin, 2015: *Der Wandel des deutschen Videoverleihmarktes durch Digitalisierung und Internet*. SOI Discussion Paper 2015-01.

Dolata, Ulrich, 2014: *Märkte und Macht der Internetkonzerne. Konzentration – Konkurrenz – Innovationsstrategien*. SOI Discussion Paper 2014-04.

Kungl, Gregor, 2014: *The Incumbent German Power Companies in a Changing Environment*. SOI Discussion Paper 2014-03.

Dolata, Ulrich / Schrabe, Jan-Felix, 2014: *Masses, Crowds, Communities, Movements. Collective Formations in the Digital Age*. SOI Discussion Paper 2014-02.

Neukirch, Mario, 2014: *Konflikte um den Ausbau der Stromnetze*. SOI Discussion Paper 2014-01.

Dolata, Ulrich / Schrabe, Jan-Felix, 2013: *Zwischen Individuum und Organisation. Neue kollektive Akteure und Handlungskonstellationen im Internet*. SOI Discussion Paper 2013-02.

Kosche, Robert, 2013: *Kollektive Identitäten in Industrial Cultural Districts*. SOI Discussion Paper 2013-01.

Fuchs, Gerhard / Hinderer, Nele / Kungl, Gregor / Neukirch, Mario, 2012: *Adaptive Capacities, Path Creation and Variants of Sectoral Change*. SOI Discussion Paper 2012-02.

Fuchs, Gerhard / Wassermann, Sandra, 2012: *Organising a Market. Photovoltaics in Germany*. SOI Discussion Paper 2012-01.

Werle, Raymund, 2011: *Institutional Analysis of Technical Innovation. A Review*. SOI Discussion Paper 2011-04.

Dolata, Ulrich, 2011: *Radical Change as Gradual Transformation. Characteristics and Variants of Socio-technical Transitions*. SOI Discussion Paper 2011-03.

Dolata, Ulrich, 2011: *The Music Industry and the Internet*. SOI Discussion Paper 2011-02.

Schrabe, Jan-Felix, 2011: *Der Wandel des Buchhandels durch Digitalisierung und Internet*. SOI Discussion Paper 2011-01.

Books

Dolata, Ulrich, 2013: *The Transformative Capacity of New Technologies. A Theory of Sociotechnical Change*. London: Routledge.

Dolata, Ulrich, 2011: *Wandel durch Technik. Eine Theorie soziotechnischer Transformation*. Frankfurt / New York: Campus.

Dolata, Ulrich / Schrape, Jan-Felix, 2018: *Collectivity and Power on the Internet. A Sociological Perspective*. Cham: Springer.

Dolata, Ulrich / Schrape, Jan-Felix, 2018: *Kollektivität und Macht im Internet. Soziale Bewegungen – Open Source Communities – Internetkonzerne*. Wiesbaden: Springer VS.

Dolata, Ulrich / Schrape, Jan-Felix (Hg.), 2013: *Internet, Mobile Devices und die Transformation der Medien*. Berlin: Edition Sigma.

Fuchs, Gerhard (Hg.), 2017: *Lokale Impulse für Energieinnovationen*. Heidelberg: Springer.

Fuchs, Gerhard / Shapira, Philip (Eds.), 2014: *Rethinking Regional Innovation*. Springer: Shanghai (chinese edition).

Kungl, Gregor, 2018: *Die großen Stromkonzerne und die Energiewende*. Frankfurt am Main: Campus.

Schrape, Jan-Felix, 2016: *Open-Source-Projekte als Utopie, Methode und Innovationsstrategie*. Glückstadt: Hülsbusch.

Schrape, Jan-Felix, 2015: *Kommunikation und Partizipation im Social Web. Eine Übersicht*. Studienbrief der FernUniversität in Hagen.

Schrape, Jan-Felix, 2012: *Wiederkehrende Erwartungen. Prognosen, Visionen und Mythen um neue Medien seit 1970*. Boizenburg: VWH.

Schrape, Jan-Felix, 2011: *Gutenberg-Galaxis Reloaded?* Boizenburg: VWH.

Schrape, Jan-Felix, 2010: *Neue Demokratie im Netz? Eine Kritik an den Visionen der Informationsgesellschaft*. Bielefeld: Transcript.

Recent Journal Articles and Contributions

Dolata, Ulrich, 2020: Plattform-Regulierung. Koordination von Märkten und Kuratierung von Sozialität im Internet. In: *Berliner Journal für Soziologie* 29, 179–206.

Dolata, Ulrich, 2020: Sektoraler Wandel durch Technik. In: Blättel-Mink, Birgit / Schulz-Schaeffer, Ingo / Windeler, Arnold (Hg.): *Handbuch Innovationsforschung*. Heidelberg: Springer.

Dolata, Ulrich, 2019: Privatization, curation, commodification. Commercial platforms on the Internet. In: *Österreichische Zeitschrift für Soziologie* 44(S1), 181–197.

Dolata, Ulrich, 2018: Big Four – Die digitale Allmacht? In: *Blätter für deutsche und internationale Politik* 63(5), 81–86.

Dolata, Ulrich, 2017: Technisch erweiterte Sozialität. Soziale Bewegungen und das Internet. In: *Zeitschrift für Soziologie* 46(4), 266–282.

Fuchs, Gerhard, 2020: Innovation und sozialer Wandel: Zur Transformation strategischer Handlungsfelder. In: Blättel-Mink, Birgit / Ebner, Alexander (Hg.): *Innovationssysteme*. Wiesbaden: Springer VS, 209–228.

Fuchs, Gerhard, 2019: Legitimacy and field development: Electricity transition(s) in Germany. In: *Global Transitions* 1, 141–147.

Kungl, Gregor, 2020: Die deutsche Energiewende: alte Konflikte in neuem Gewand? In: *Politikum* 6(2), 54–61.

Kungl, Gregor / Geels, Frank W., 2018: Sequence and alignment of external pressures in industry destabilisation. In: *Environmental Innovation and Societal Transitions* (26), 78–100.

Schrape, Jan-Felix, 2020: Verteilte Innovationsprozesse. In: Blättel-Mink, Birgit / Schulz-Schaeffer, Ingo / Windeler, Arnold (Hg.): *Handbuch Innovationsforschung*. Heidelberg: Springer.

Schrape, Jan-Felix, 2020: Irritationsgestaltung in der Plattformöffentlichkeit. In: Eisenegger, Marc et al. (Hg.): *Digitaler Strukturwandel der Öffentlichkeit*. Mediensymposium Bd. 15. Wiesbaden: Springer VS, 175–190.

Schrape, Jan-Felix / Mölders, Marc, 2019: Digital Deceleration. Protest and Societal Irritation in the Internet Age. In: *Österreichische Zeitschrift für Soziologie* 44(S1), 199–215.

Schrape, Jan-Felix / Siri, Jasmin, 2019: Facebook und andere soziale Medien. In: Baur, Nina / Blasius, Jörg (Hg.): *Handbuch Methoden der empirischen Sozialforschung*. 2. Auflage. Wiesbaden: Springer VS, 1053–1064.

Schrape, Jan-Felix, 2019: The Promise of Technological Decentralization. A Brief Reconstruction. In: *Society* 56(1), 31–37.

Schrape, Jan-Felix, 2019: Open-source Projects as Incubators of Innovation: From Niche Phenomenon to Integral Part of the Industry. In: *Convergence* 25(3), 409–427.