

The dimensions of streaming: toward a typology of an evolving concept

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Abstract

Based on research on the development of streaming solutions across media forms and industries, this article traces the dynamics and dimensions of the notion of streaming. It theorizes streaming as an evolving concept, and argues against strict, set and limited definitions such as those suggested by Lotz and Herbert et al. A short substantive and industrial history of streaming is provided, recognizing its many manifestations and variations. Five key dimensions are identified, and trends and traits within each of them discussed: (1) professional versus user-generated streaming, (2) legal versus piracy streaming, (3) on-demand versus live streaming, (4) streaming on dedicated versus multi-feature platforms, and (5) niche versus general-audience streaming. The article concludes by pointing out how streaming is a concept that metaphorically unites media research across industries, practices, and media forms, encouraging more comparative research.

Keywords

film industry, Internet, media distribution, media platforms, music industry, piracy, publishing industry, streaming, television industry, user-generated content

Introduction

Digital streaming services are increasingly common in ever more segments of the media industries. While YouTube, Netflix, and Spotify remain the main reference points in the

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streaming discourse, a number of services have appeared – and disappeared – making for a rich, complex, and dynamic landscape of services that apply some version of the streaming model. At its core, streaming seems to signify a limitless way of distributing and consuming media content. Corporate representatives and Internet activists alike underline what they argue is the transformative or disruptive nature of streaming. However, despite the wide usage of the concept across media sectors, the majority of research on the phenomenon has been confined to *one* type of content (music or video or books) and *one* type of industry (the music industry or the television industry or the film industry) (see, for example, Dixon, 2013; Johansson et al., 2018; Lobato, 2019). Furthermore, the scholarly literature has usually only dealt with the contrasts within *one* dimension of the streaming phenomenon (e.g. live versus on-demand streaming – for example, Taylor, 2018; or streaming of professional versus user-generated content – for example, Burgess and Green, 2018). In this article, in contrast, we aim to develop a multi-layered typology that stretches across the multiple manifestations and many dimensions of streaming.

If we start at a purely technical level, it is possible to define streaming – as it is commonly used in relation to Internet and new media services – as the transmission and retrieval of digital content that is stored and processed on a remote server. Contrary to downloading, the content is only temporarily retained in the cache, not permanently stored on the hard drive of the user's device. Furthermore, we need to specify that the transmission takes place through digital networks based on TCP/IP, the underlying core protocol for *all* Internet transmission. The basic principle of TCP/IP is known as 'packet switching', which means that content is not transferred as steady, continuous streams (even in the case of 'streaming content') on open, uninterrupted lines (like traditional broadcasting or telephony), but in small, sequential packets of data that are sealed and reopened (like traditional letters). We have probably all experienced the downside of this solution: streams that lag and buffer and halt and freeze when we least want them to. However, while traditional broadcasting technology, for example, may literally offer more continuous streams, and a book on paper may provide a more comfortable reading experience, the principle of packet switching accounts for other affordances that have contributed to the popularity of Internet-based streaming solutions: the possibility for time-shifting and on-demand retrieval, access to vast libraries of content and limitless number of channels, and the use of multiple devices for retrieval.

As a concept, streaming has been in common usage in relation to data traffic and network distribution since at least the 1980s – but it is only in the last decade that it has moved to the center stage of contemporary Internet and media discourse. It is exactly this movement, and its various manifestations, that is our concern in this article. To understand that, we need to move beyond a purely technical definition of streaming and look into the ways streaming has been embedded in and constitutes part of various socio-technical assemblages.

There have only been a few earlier attempts at theorizing streaming comparatively. However, our approach differs in significant respects from these. Lotz (2017) restricts her definition of Internet-distributed television to 'long-form content most similar to that recognizable as "television"' (e.g. Netflix, Hulu, HBO Now) and leaves unconsidered 'the parallel industry developing around what began as user- and amateur-generated content' (e.g. YouTube) (pp. 8–10). A similar perspective is taken by Herbert et al. (2018) in

their analysis of streaming in the film, television, and music industries. While these may be sensible approaches in order to dive deep into certain forms of streaming taking place within the confines of an industry, the strategy runs the risk of missing out important dynamics and developments. As Cunningham and Craig (2019) point out, streaming on social media platforms like YouTube or through informal channels may constitute ‘a more radical *cultural* and *content* challenge to established media’ (p. IV, emphasis in original). In effect, an industry-centric approach may stabilize a notion of what streaming is in a field where the strategies and practices of the parties involved are rapidly evolving and shifting (c.f. also Lobato, 2019). Thus, in this article we take a contrasting approach, not searching for a strict definition, but instead seeking to unfold the streaming concept by trying to identify the key dimensions of streaming in its many manifestations and variations.

Part of the rationale for this approach is that streaming technologies are not closed off as technological systems: Markets are still immature, and solutions are yet open to evolve. Using a concept from Science and Technology studies, we may say that streaming services are still open to ‘interpretative flexibility’ (Pinch and Bijker, 2012: 21). In order to capture both characteristics that can hold the streaming concept together, while simultaneously avoiding pinning down our object of study, our analysis results in a set of five dimensions. We suggest that these dimensions need to be taken into account for a comprehensive understanding of how streaming practices and services have developed and continue to influence the media and culture industries. Each of the five dimensions does not apply to the same degree in each industry or for each service, but together they constitute a ‘space of possibilities’ (Csikszentmihalyi et al., 2018) in which the streaming phenomena play out.

We will start by offering a short history of how streaming gradually has affected and become part of the different media industries. Then we will look at the various ways in which the concept manifests itself in contemporary media discourses, the user practices with which it has become entangled, the business models to which it has given rise, and the sorts of content that feed into it – in short, what we call the dimensions of streaming. We conclude by pointing out some current traits and trends within these and important areas for further scholarly engagement.

A short substantive and industrial history of audio, video, and text streaming

In this section, we will provide a short history of audio, video, and text streaming as it has developed in and around the media industries. The first uses of the term ‘streaming’ in relation to computing probably dates back to the 1970s, and, as mentioned, the term was in common usage from the 1980s. At that time, streaming had primarily a local designation, for example, that you could watch while recording on the same computer or transmit data in a local network. The wide area networks at the time had neither the capacity nor the protocols to allow for true-time transmission of anything but pure text.

The first long distance audio streaming event in history probably took place in 1991 (Spilker and Hoier, 2013). Throughout the 1990s, audio streaming technology developed rapidly. The first media industry to be affected by Internet streaming was the radio

industry. In the late 1990s and beginning of the 2000s, more and more established radio stations started to offer their ordinary broadcasts also through Internet, a popular service among diasporas. This was usually done as a low-budget add-on without any separate business plan, just a repurposing of the broadcasts (same shows, same time, with the same ads, etc.). Pure Internet radio stations also started to pop up, often devoted to politically progressive content or alternative cultural expressions (Atton, 2004).

The next industry to be affected, was the music industry. Some Internet music radio stations began to develop selectable options, whereby the listener was given the opportunity to choose music according to genre or playlists. Effectively, these stations were on their way from being radio stations to becoming on-demand music streaming services (Morris, 2015). Eventually, solutions that gave users even greater opportunities for self-curation appeared, such as Rhapsody and LastFM (Mulligan, 2016). However, while Internet radio channels were allowed to operate through extensions of their broadcast license agreements, the early music streaming services operated in a more unclear and complex legal landscape and often encountered limitations and resistance from the established music industry.

Throughout the 2000s, it was not streaming, but file-sharing that was the big headache for the music industry. Therefore, the first venture into digital music that had the collective support of the record industry, was the establishment of Apple's legal download service iTunes in 2003. However, even if the iTunes Store experienced a steady growth throughout the 2000s, it did not make up for the decline in CD sales, and illegal downloading grew even more, while video streaming services based on user-generated content (UGC) such as MySpace and YouTube also became important players in the music field. The ground was laid bare for other types of initiatives (Mulligan, 2016; Spilker, 2018). The launch of Spotify in 2008 was the decisive moment of the streaming overturn in music; later followed Tidal, Apple Music, YouTube Music, and more. In the Scandinavian countries, streaming now accounts for more than 80% of music revenues, and in 2016, it had become the most important revenue source worldwide (Nordgård, 2016, 2018).

While transmission of sound through streaming media protocols demanded comparatively little broadband width, video streaming posed a bigger challenge. Early initiatives such as WebTV and interactive TV (iTV) provided glimpses of what was to come but were ultimately fruitless. With the extension of broadband connections and more efficient file compression technologies and transfer protocols, video streaming became a viable option on the Internet, starting small scale in the mid-1990s. Much like the music industry, however, the field was still dominated by download-only services and sales of physical copies in the form of DVDs. Another similarity was the prevalence of piracy and peer-to-peer services (Smith and Telang, 2016).

Technological hurdles for video streaming were mostly overcome with the introduction of so-called adaptive streaming, making the quality of streams increasingly more reliable. The porn industry was early to drive new innovations and solutions in this field (Keilty, 2018). However, the most significant breakthrough for video streaming came in 2005, when YouTube was launched. YouTube quickly became one of the most trafficked web sites and remains by far the largest video streaming service. YouTube is now much more than a portal for amateur videos, but despite the wealth of professionally produced

content on the site, it still occupies an outsider role vis-à-vis the film and television industries (Burgess and Green, 2018; Herbert et al., 2018).

From a television industry perspective, the advent of streaming can be seen as part of a shift that has been termed the post-network, or post-TV, era (Strangelove, 2015). While the picture is different from country to country, the overall tendency is for traditional cable operators and domestic broadcasters to be challenged by services that rely on Internet-enabled distribution models (Lotz, 2018). Netflix is the paramount example of such industry disruptors, starting out in 1997 as a DVD rental business and turning into a streaming service in 2007. Netflix's business model differed from YouTube in two respects: First, it was a paid subscription service, and second, it offered access (only) to catalogs of professionally produced TV-series and films.

While Netflix remains a common reference point, it is in fact just one of many services providing streaming solutions for video. According to Herbert et al. (2018), by 2015 there were nearly 100 different streaming services in the United States alone. Hulu, HBO, and Amazon Prime are the best known of these, but there exists a plethora of niche services and services operating on the fringes that constitutes an important part of the current streaming landscape. In later years, live streaming – spearheaded by Twitch – has become 'the next big frontier of streaming' (Sanson and Steirer, 2019).

The case of Twitch indicates how streaming has entered the gaming industry (Johnson and Woodcock, 2018). In this section of the media industries, streaming solutions are split between platforms for live streaming of gameplay, such as Twitch, and services which offer games under the subscription model, such as Playstation Now, Xbox Game Pass, and Google Stadia (launches November 2019).

Finally, digitization has opened up for innovative streaming solutions for text-based media such as books, newspapers, and magazines as well. Especially for the case of digital books, there are a range of similarities and overlaps with other streaming media. The business models and distribution practices are quite similar, and there are both similarities and differences in the technical solutions developed for digital text compared to audio, video, and multimedia. The subscription model is much used for books, and has also been applied to digital items, such as when O'Reilly Media in 2000 launched Safari Books, a subscription service for, among other things, ebooks.

However, the rise of mass-marketed streaming services for digital books, including ebooks and audio books, is more recent. The launch of the US-based Scribd in 2007, a subscription service which features ebooks, audio books, comic books, and UGC (i.e. self-published works), is a landmark. Swedish Storytel (est. 2005 under the name Bokilur) is another early mover that has been particularly expansive in recent years, acquiring and partnering with existing publishers and retailers in many European markets. Today, the most important global player is Amazon, which launched its Kindle Unlimited in 2014. The increasing popularity of audio books has seen hybrid services offering both text-based and audio-based titles, concentrate on the latter. Digital books in audio format delivered as streaming bears a clear resemblance to music streaming. Thus, it is unsurprising that both Spotify and Soundcloud have expanded to include 'talking books' – a clear illustration of the hybridity, overlaps and evolving practices in the field. However, the streaming book markets are still quite fragmented, both along national and linguistic dividing lines and along different types of content (Colbjørnsen, 2012).

Seen together, this brief, historical, cross-industrial review shows how the introduction of streaming solutions has led to significant transformations in the distribution of all kinds of media content (audio, video, text, multimedia). We can sum up our findings so far in three points:

- Streaming has moved from the periphery to the center of Internet development.
- Streaming has affected all traditional media industries.
- Streaming solutions come in a multitude of variants.

In the next section, we will take a closer look at these different variants, trying to delineate the central dimensions along which they are dispersed.

The dimensions of streaming

As stated in the 'Introduction' section, our aim in this article is to move beyond a purely technical definition of streaming and investigate the various forms of streaming that one can find in the contemporary media field. We have identified five dimensions that we will argue are key in relation to the evolution of streaming:

1. Professional versus user-generated streaming
2. Legal versus piracy streaming
3. On-demand versus live streaming
4. Streaming on focused versus multi-purpose platforms
5. Niche audience versus general-audience streaming

In the following sections, we will discuss the dynamics within each of these dimensions.

Professional versus user-generated streaming

There exists a marked distinction between streaming platforms that have based their business idea on the distribution of professionally produced content (either self-developed such as television channel based services like HBO Now or third-party platforms such as Netflix and Spotify) and platforms that have been based on the idea of giving users the possibility to and easy means for broadcasting their own content (such as YouTube, Twitch, and Soundcloud). As we have seen, Lotz (2017) and Herbert et al. (2018) have even suggested that these two types are so different that they should be treated as separate phenomena. However, then we would miss out on some of the central movements and transformations within the field, not least convergences between services devoted to professional and UGC.

Undoubtedly, it was the advent of YouTube and the phenomenon of UGC that moved streaming to the center of Internet and media development. Burgess and Green (2018) point out how YouTube built on the legacy of community-based sharing sites for amateur videos and that the platform's initial success was based on its ability to cater to the interests of its users. However, YouTube has from the outset also been open to more

professional types of content: ‘There have always been two simultaneously operating YouTubes: one oriented towards professional production [. . .] and one [. . .] providing a platform for everyday expression, vernacular creativity, and community formation’ (Burgess and Green, 2018: 12). A related double-sidedness exists with Amazon’s book streaming platform Kindle Unlimited (KU), which provides a portal for self-published material alongside titles from established publishing houses and high-profile authors.

It is worth noting that catering for UGC has always had a commercial side – for YouTube, for Twitch, for Amazon, for Soundcloud, and most other examples of platforms open for this type of content, whether commercialization has taken place through exposure to advertisements, subscriptions, sales of gear, or other types of micro transactions. Furthermore, there is a noticeable trend that these platforms tend to become more commercialized over time – or maybe we should rather talk about an overall trend toward intensified commercialization and professionalization within the streaming space.

This move toward professionalization and commercialization has taken many forms. First, platforms open for UGC have increasingly invested in professionally produced content, for example, deals with eSport organizers in the case of Twitch or official music video brokers in the case of YouTube. Second, we have witnessed a professionalization of amateur content according to purely commercial criteria (likes and followers), through an advanced patronage system giving ‘partner’ or ‘star’ status to the (few) most popular content creators. Third, the design of the platforms has been subject to streamlining to offer ‘better’ usability while ‘non-fitting’ content has been blocked or marginalized through various forms of moderation (see for example, Gillespie, 2010 for a telling illustration of the marginalization of soft-porn on YouTube). Fourth, there has been an increased employment of algorithms favoring popular and paid-for content. And fifthly, the platforms have introduced ‘premium’ subscriptions such as Twitch Prime, YouTube Premium, and YouTube Music, giving users ad-free experiences and access to exclusive content.

While the move ‘upstream’ toward professionalization undoubtedly has been the dominant trend, examples of ‘downstream’ movements can also be found. Spotify was from the start a pretty ‘sealed’ platform, offering only music delivered through their deals with established record companies. Later, they lowered (somewhat) the barriers for amateur and independent artists to upload their own music (Eriksson et al., 2019). Overall, we might conclude that there exists a division of labor both within and between platforms when it comes to user-generated versus professional content. However, it is a dynamic division, and the entanglement, synergies and tensions between professionals and amateurs are still an innovative factor in the streaming landscape.

Legal streaming versus piracy streaming

In Scandinavian discourse, streaming has been connected primarily with legal alternatives to illegal downloading, as the solution to the piracy wars of the 2000s (Spilker, 2018). In other countries, such as in the United States, it seems that streaming more often has been and still is associated with piratical practices (Burroughs, 2015; Lobato and Thomas, 2015). The 2018 Music Consumer Insight Report (IFPI, 2018) shows that music streaming still comes in both legal and illegal variants: While legal streaming services

experience a formidable growth, 38% of the global music listeners still acquire music through illegal means, and the most popular form of copyright infringement is ‘stream-ripping’ (recording audio streams from sites like YouTube).

Historically, piracy (as well as legality) has been a moving target. Lobato (2017) analyzes how various forms of streaming piracy has developed in the 2010s and largely replaced the dominant torrent-based downloading piracy of the 2000s, while at the same time leading to a fragmentation of piracy: The use of illegal, mobile streaming sites; tricking of platform filters to upload/share illegal content on UGC sites like YouTube and Twitch; geoblock-violations through VPN/DNS services; jailbreaking of TV-extension devices such as Apple TV or modification of open-source media players such as Kodi. Burroughs (2015) also makes the observation that media piracy has changed in form and organization. While the 2000s belonged to the massive and conspicuous piracy networks and services, in the 2010s piracy has taken on a more hidden and ephemeral character, not any longer happening in online communities, but through provisional alliances.

Access to simulcasts of real-time sports, popular series and other attractive content is provided through temporary indexing sites, moving accounts and shout-outs. A telling example of this was given by a Twitch user: Ahead of a champion match in boxing, a streamer had created several hundred ‘false’ Twitch accounts. Each time Twitch’s detection system discovered the illegal broadcast – which usually took a minute or so – the transmission was moved to another account. Rumors about such actions were often spread on sites like Reddit (Ask et al., 2019). Modern piracy, in Burroughs’ account, also takes the form of more mundane activities such as borrowing and exchanging accounts from and between relatives and friends, sharing logins and passwords, and siphoning free promotions and subscriptions. Piracy streaming is ‘theorized as a liminal space, wherein streamers ephemerally buck the media logic of media industries’ (Burroughs, 2015: 18).

Jakobsson and Stiernstedt (2010) provide a different take on the interplay between piracy and legality. They argue that the real pirates are not Burroughs’ volatile tricksters, but the mega ventures of Silicon Valley with YouTube in front. Their claim is that YouTube eventually became accepted not because YouTube were smaller pirates than The Pirate Bay, but precisely because they were bigger pirates. Pirate Bay was still small and marginal enough for the record companies to dare to penalize and prosecute, while YouTube had grown too big and had too powerful friends. Under high pressure, the established media industries felt forced to negotiate with new players and accept new rules of media distribution, thereby moving the borders of legality in the same token. In a related type of argument, Spilker (2018) argues that the rise of Spotify does not represent ‘the triumph over piracy’ but rather ‘the triumph of piracy’.

Thus, piracy has in different ways played an invaluable role in developing the contemporary streaming landscape (Allen-Robertson, 2013). Bureau (2014) makes a distinction between ‘conformist’ and ‘subversive’ forms of piracy and piratical technologies. Conformist piracy occurs when piracy develops into ‘a stable deviance that is recognized and combated by the authorities’ (p. 427). Subversive piracy, however, successfully challenges society’s status quo and transform the rules and values of the society: ‘The game change and the pirates are no longer deviants but legitimate entrepreneurs’ (p. 427).

This is a distinction that resembles the different types of piracy we have described earlier. However, Bureau underestimates the permeability and transformability of both

types. A dominant trait in the recent years is how services like Netflix, YouTube, and Twitch face reinforced accusations of copyright violations from right holders (Evens and Donders, 2018; Lobato, 2019). For this and other reasons, the services assimilate more of the traditional logic and priorities of the established media industries (Burgess and Green, 2018) – thus, the subverts become themselves subverted. The other distinct trend we can observe is the fragmentation and ephemeralization of ‘conformist’ piracy that Lobato (2017) and Burroughs (2015) describes. Obviously, this represents a displacement of piracy toward marginality. However, it is nevertheless probable that the inventive tactics of the ephemeral pirates will be a shaping factor of streaming in the years to come. The piracy-legality dimension is still unsettled.

Live versus on-demand streaming

The rise of streaming services has been tightly coupled to the promise of individual freedom and flexibility. The new technologies would provide the media user with the possibility to choose what and when to watch or listen through self-scheduling, time-shifting, and on-demand retrieval. In that manner, these technologies constitute a threat to the media industries that are based on live and scheduled content delivery, specifically, the television and radio industries. For some years, researchers and media analysts have been discussing to what extent Netflix, Hulu, YouTube, and other on-demand streaming services would represent the death of linear-TV (see for example, Buonanno, 2016; Lotz, 2018). It had become a kind of established truth in media studies that only sports and other great events would uphold the linearity and liveness of traditional television (see for example, Stover and Moner, 2014).

In this light, the emergence and rising popularity of live streaming in various forms in recent years may have come as sort of a surprise. Nonetheless, live streaming has expanded – in all the variants we have discussed so far, both as user-generated and as professional, legal and illegal forms.

The live-streaming platform Twitch is probably the best example of the turn toward live. It has a pre-history (as ‘Justin.tv’) dating back to 2007, starting as a general-purpose platform for all types of event live streaming, with a wide range of categories such as ‘News & Tech’, ‘Divas & Dudes’, ‘Sports’, ‘Music’, and ‘Gaming’. In 2011, the gaming section was separated from the rest of Justin.tv and rebranded as ‘Twitch.tv’. Indeed, even if Twitch has now opened once again up for other categories than gaming, it is as a game live-streaming platform that Twitch has become famous. With more than 2.2 million monthly broadcasters (Taylor, 2018), it mixes user-generated broadcasts, with an increasing range of professional content such as eSport tournaments and speed gaming contests. Twitch was bought by Amazon in 2014.

Twitch’s main contender when it comes to game streaming content, YouTube, followed in 2013 with the launch of YouTube Live, and, notably, social media platforms like Facebook (2016) and Instagram (2017) have also invested in live-streaming features.

Another form of live streaming is the usually illegal simulcasting or re-broadcasting of television programs – that is, the unauthorized forwarding of media content that is initially only available through subscriptions on pay TV or in other ways restricted. For

a while, this type of re-broadcasting took place quite openly, as with Justin.tv and Popcorn Time in its heydays. As the discussion and examples that we gave in the piracy section show, this type of activity is still common, but has taken on a more fringe and ephemeral character.

Perhaps, even more important is the way traditional broadcasters have led in fostering a revival of professional live content in the streaming domain (Sørensen, 2015). Evens and Donders (2018) show how traditional broadcasters and pay-television operators have started to integrate streaming into their current offerings or launching stand-alone services. To be able to battle in the new marketplace, they have assembled their most valuable assets – their content rights, including their rights to scheduled live transmissions of sports and other events – and used them as a spearhead to get a hold in the market.

In 2015, ‘binge-watching’ was perhaps the trendiest word of the year, reflecting how the Netflix model of releasing all episodes of a series at the same time threatened to disrupt traditional ways of television programming. However, 2 years later, HBO Now struck back, releasing the seventh season of Game of Thrones episode-wise, in the traditional manner with new episodes at US prime time every Sunday evening – demonstrating that the streaming generation was willing to be seated in front of the screen at set times. Sanson and Steirer (2019) argue that “‘live’ viewing seems less a vestige of legacy television than the next big frontier of streaming’ (p. 13). Evens and Donders (2018) point at the irony: ‘It seems that live television has become the killer app for on-demand platforms that always wanted to revolutionize the business of live television’ (p. 66).

On the consumer side, users have discovered that live streaming has some affordances that are not easily replaced by on-demand – actuality, of course, as the example of Game of Thrones illustrate, but also presence and sociability, which possibly accounts for much of the popularity of Twitch (see Spilker et al., 2018; Taylor, 2018). Streaming as a service is maturing, and, as part of this, a new division of labor between live and on-demand is under negotiation.

Streaming on focused versus multi-purpose platforms

Streaming platforms differ when it comes to what kinds or range of usages they facilitate. They have to balance between being technically specialized or multi-feature platforms – between being especially good at something and catering for a plethora of uses. As we saw, Twitch has developed from the bottom-up as a platform dedicated to live streaming, and this has been and will possibly continue to be a main advantage in competition with other platforms now investing in live streaming. Instagram, Twitter, Facebook, and YouTube are social network or video-on-demand platforms that have to add live streaming onto a differently designed technical infrastructure. This probably explains why YouTube has not been especially successful with its heavy investment in YouTube Live. Conversely, Twitch faces the same challenge when developing on-demand features.

Another example regards the degree of social media functionality that streaming platforms offer. On on-demand services focusing on professional content – such as Netflix or the streaming services of the established broadcasters – the amount of social media

functionality is usually very limited. On Twitch, however, features such as chat and friend lists are a central part of the design, and the interactions between users are very much part of the content of the broadcasts. In its early years, Spotify focused a lot on community creation through social media functionality – however, with limited success (Hagen and Lüders, 2017). The company has more recently concentrated its investments in the development of recommendation technology (Eriksson et al., 2019). On the other side of the spectrum, we see that platforms that must be regarded as primarily social media platforms are experimenting with streaming functionality and features. Facebook, for example, has recently established both a live-streaming service, Facebook Live, and an on-demand service, Facebook Watch.

The coupling of streaming with e-commerce is another case in point. This has been a site of intense innovation and aggressive development in the later years, especially on the ad-based platforms. In a global context, Cunningham and Craig's (2019) analysis of the Chinese live-streaming industry and Van Dijck et al.'s (2019) comparative analysis of the Western and the Chinese platform ecosystems shows that e-commerce forms an integral part of Chinese streaming services, pointing at the importance to look beyond singular platforms to include considerations of the infrastructural aspects of the ecosystems they are part of.

Gillespie (2018) claims that it is imperative that platforms include more and more features as responses to demands for growth and competition. Live streaming as a feature for ever more platforms may seem to confirm this. However, we also find examples on the opposite end – for example – the narrowing of Justin.tv/Twitch to focus solely on game-related content back in 2011 and the downgrading of social media functionality on Spotify. Streaming and social media users seem to develop preferences for different types of platforms for different types of content and practices, depending on which platform is most suitable. Burgess and Green (2018) talk about a 'cross-platform model of practice' where users are accustomed and confident with operating across an array of streaming and social media platforms. Twitch users have been found to navigate across platforms: While Twitch was used for live streaming, users would learn about special happenings or controversies on Reddit, watch highlights and replays on YouTube and communicate with friends and fellow players through VoIP-communities such as Discord or TeamSpeak (Spilker et al., 2018).

Niche audience versus general-audience streaming

Finally, our fifth dimension deals with the tension between platforms catering to specific or general audiences. Generally, there is a drive for commercial services over time to try to expand and reach as broad an audience as possible – just as there is an urge to test out new features and functionality. But the starting point is usually niches in the marketplace, where the platforms have a stronghold. Users can be delimited on the basis of, for example, interests, affiliation, and linguistic or geographic borders. Most people will think of YouTube as a general audience platform. However – as can be discerned by looking at its most popular channels – the platform has a special stronghold among the music and gaming communities. Therefore, it was a natural move when the company in 2018 established YouTube Music as a service especially targeted at their music audience.

However, Twitch has for several years catered especially to the gaming community, but has, since Amazon's acquisition in 2014, moved to become more of a general-audience platform for live streaming. The company appears fully aware that it has become the world's leading live-streaming platform by tapping into the engagement of a specific and committed user group rather than catering to a general public. By continually scripting its users as gamers, including investments in exclusive eSport competitions and cooperation with game development companies, the company is trying to keep the gaming community aligned. At the same time, Twitch and Amazon are eager to exploit the position of the platform to reach out to a broader audience – as indicated both by the new content categories and by bundling with Amazon Prime. However, opening up the platform runs the risk of loss of community and a less loyal user constituency. The tension between niche and general audience is also witnessed in digital book streaming where Kindle Unlimited and Storytel both run a double game: They cater to niche audiences for specific genres (e.g. romance, erotica, crime), while also offering broad and comprehensive catalogs.

Perhaps, the most important distinctions regarding audience reach are the ones based on language or geography. Burroughs (2015) distinguishes between three types of services in this regard: (1) *transnational* streaming companies, such as most of the services we have been discussing, which have established their services in a host of different countries; (2) *national* streaming companies, which operate within the confines of the nation state (or another delimited territory) and (3) *diasporic* streaming, which covers streaming companies that cater to a single niche or diasporic network (e.g. services such as iROKO.tv offering Nollywood films to the Nigerian diaspora).

We should note that the composition of the markets varies considerably according to type of media content. In the case of music streaming, transnational or global actors are dominating. The situation is somewhat more nuanced when it comes to film/television and to publishing (Sanson and Steirer, 2019). In the television and film markets, national networks and public broadcasters maintain strong positions, and markets are still delineated by national and regional boundaries, perpetuated by language barriers and licensing arrangements. Netflix is perhaps the one actor in television and film that has successfully targeted a global streaming audience. The world of books is similarly split: While the market for English language ebooks and audio books is dominated by Amazon, there continue to be substantial national and regional differences.

Conclusion

We started this article with a brief historical review, showing how streaming during the last decades has moved from the periphery to the center of Internet development and has affected all traditional media industries. At the same time, we noted how streaming solutions come in a multitude of variants. We then went on to identify five key dimensions in the streaming domain. These dimensions have a descriptive aspect: They constitute a conceptual framework that can be used to identify the characteristics of different streaming solutions and contrasts between them. They have a prescriptive aspect: They clarify the scope of opportunities for producers and users of streaming services. Finally, they have an explanatory aspect: They can be used to account for the dynamics within the

field. Streaming is a field where the strategies and practices of the parties involved are rapidly evolving and shifting. Throughout the discussion, we have identified some traits that at least for the time being seem to characterize the development.

First, there is a trend that professional content is becoming more important also for services initially based on UGC. However, UGC is still important, but arguably under conditions over which users have less and less control (Burgess and Green, 2018).

Second, the trend is that legal streaming is taking an increasing hold of the streaming field while piracy is being displaced to the fringes and outskirts, where it assumes new, more volatile and ephemeral shapes.

Third, we can debunk the myth that on-demand is going to replace live broadcasting wholesale. Rather, a new division of labor between live and on-demand is under negotiation.

Fourth, Gillespie (2018) is only partly right in claiming that it is imperative that platforms include more and more features as responses to demands for growth and competition. Users are comfortable with and confident with operating across an array of platforms for different purposes, and for platforms the most important is to be recognized as best at one or a combination of some functions or features.

Fifth, the trend toward transnational services was manifested quite early in the streaming history, but operates differently across industry sectors and content types. By targeting niche audiences – whether based on cultural, linguistic, or geographic characteristics – a company can still gain a competitive advantage.

This article is an intermediate step in our own research, and some of our claims need to be substantiated through further research. However, our conceptual work has clear implications for the identification of important research tasks in the field. Streaming as a key distribution technology for media content is a fairly young phenomenon and still relatively little research exists in the field. Especially, very little comparative work has been done – the study of Herbert et al. (2018) being one exception. Our discussion points to the importance of doing more comparative research on the phenomenon.

Streaming is a concept that metaphorically unites people across industries, practices, and content. While we earlier listened to music, read books, and watched TV and film – now we all stream. Our discussion points to some similarities as well as differences with regard to industrial constellations, content facilitations, and user practices. To start with the industrial constellations, streaming has become a common distribution technology for what used to be and still involves, to a large degree, separate industries with specific characteristics (c.f. Herbert et al., 2018).

Our five dimensions can be used to assess the streaming field more thoroughly and get a better understanding of the implications of different trajectories – for example, how the relationship between professional and user-generated or on-demand and live content has affected the industries in different ways or how specific-audience and general-audience services are configured differently. A special topic that is in urgent need of more attention is the relationship between established players within the industries and new players coming from the technology side (c.f. Evens and Donders, 2018). As we have touched upon briefly, the different industry players have reacted – co-operated and competed – differently with new companies such as YouTube, Amazon, Netflix, and Spotify.

With regard to user practices, our conceptual discussion opens up a broad range of important research questions. For example, in relation to the current upsurge of live streaming: Convenience, flexibility, and control have been identified as explanations for the rapid uptake of on-demand streaming solutions (Spilker, 2018). However, our research on Twitch use showed that presence and sociability accounted for the popularity of live game streaming (Spilker et al., 2018). Thus, the new division of labor between on-demand and live features will to a large degree depend on user preferences and practices. Which are the different factors that are important for users' choices, and are these weighted differently with respect to media types?

Another research task that emerges from our discussion regards the preferences for dedicated versus multi-feature platforms. We referred to Burgess and Green's (2018) study of YouTube users and our own study of Twitch users, arguing that users are confident with operating across an array of streaming and social media platforms. What is the adequacy of these descriptions in relation to the broader constituency of streaming users, and, again, are there any differences in this respect with regard to the type of media content or to live versus on-demand use?

A third example of research tasks regards the new, more volatile and ephemeral forms of piracy identified by Burroughs (2015). As argued among others by Allen-Robertson (2013), piracy has historically played an invaluable role in developing the streaming landscape. For example, Spotify is built on former p2p-technology (Eriksson et al., 2019), and YouTube successfully transformed the borders between legality and piracy (Jakobsson and Stierstedt, 2010). Will today's piracy remain a 'conformist piracy' (Bureau, 2014), an oppressed deviance, or will some of the piratical practices that today are considered illegal form the basis of new business practices?

Overall, more cross-industry and cross-practice research is needed to get a better understanding of streaming as a phenomenon and how it evolves. In this article, we have investigated the key dimensions of the concept of streaming in relation to contemporary media discourses. We maintain that such a broad and open-ended approach to streaming is more useful at present, rather than attempting to provide a limited definition of the phenomenon. Borders and distinctions are under negotiation and in flux: between legal and illegal, between live and on-demand, between user-generated and professional content, between national and global. For example, the differences between a basically professional content platform like Netflix, a basically UGC platform like YouTube and a basically social media platform like Facebook (offering Facebook Watch) is clearly not fixed and stabilized, neither economically nor culturally. Therefore, an exclusion of any of these from a definition of streaming is at best premature.

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