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Netflix: A Data and Media Hybrid

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Ai miei genitori

“They danced down the streets like dingledodies, and I shambled after as I've been doing all my life after people who interest me, because the only people for me are the mad ones, the ones who are mad to live, mad to talk, mad to be saved, desirous of everything at the same time, the ones who never yawn or say a commonplace thing, but burn, burn, burn like fabulous yellow roman candles exploding like spiders across the stars and in the middle you see the blue centerlight pop and everybody goes "Awww!”

Jack Kerouac – On the Road

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Netflix has changed the world of entertainment thanks to the data gathered since its early days. While technology companies are often associated with open platform organization, I have shown how Netflix is more similar to a closed portal creating and curating content, with data and technology at its core. The recommender system and the personalization techniques in place at Netflix have allowed the company to gain more power and become a more solitary player with less connections to the entertainment eco-system. Data have influenced the creation of tv shows and movies that are distributed on its online platform, making technology and entertainment intertwined while reinforcing the strength of the portal. The experience of Netflix is contributing to the changes in the viewing experience, becoming an increasingly focused data-harvesting practice.

CHAPTER 1 – An introduction

Since the early days of capitalism, technology and media have always been deeply connected. The first object ever to be produced through mass production was the Ford Model T. Mass-production deeply influenced the development of capitalist society. One of these influences was in the fruition of media. The principles of mass-production created a brand new type of society, influenced by new forms of entertainment: the so-called mass-media. The intertwining of methods of productions and culture, deeply influenced the types of entertainment that is the subject of this analysis. The mass-media became widespread after the Second World War and started its slow fall around the 1980s, with companies like Netflix completely reshaping it.

Media and technology have always had a deep connection, technology being an essential tool for the fruition of cultural products. The latest evolution of this ancient intellectual thread is the deeply entrenched connection between streaming organizations and hyper-customization of cultural products. Information technology has created a system where the cultural offer is tailored around the needs of the user, a perfect evolution of the studies of the Audience that have been made over the years. Netflix has managed to create a precise machine that perfectly responds to the cultural needs of its users through algorithms that study our behavior and feed back to us content accordingly. The Netflix recommender has created a mathematization of taste where Netflix is one step ahead when it comes to understanding our tastes. Netflix's role of predictor of our tastes has been a natural evolution of its business that started as a simple renter of DVDs via mail. The importance of data-harvesting has been understood since the early days of the company and it simple increased once Netflix decided to launch its streaming service, data being more easily gathered through the use of the Internet.

Streaming organizations have revolutionized the way we look at entertainment. Companies like Netflix have completely deconstructed the classic network structure of traditional entertainment companies through the innovative utilization of data to tackle the needs of a fast changing environment. The organizational discourse has usually placed Netflix in the big

group of platform companies, where the technology hub is the link between the various actors rotating in the ecosystem. The platform perspective is of obvious fascination because Netflix shares with classic platforms, like social media, the importance of technology embodied in data for the activities of the company and the ecosystem around it. The intellectual discourse around streaming companies has been divided between the organizational perspective and the media perspective. While the organizational perspective has highlighted a focus on the platform nature of streaming hubs, with the needed importance given to data for the correct functioning of the whole structure, the media discourse has focused mostly on the content generated by streaming companies and the way this content is conveyed. There is the need for a synthetic approach that would highlight the connections between these two areas. A new approach that would combine that technological perspective of platform studies and a media-oriented approach. This would define more clearly where Netflix stands in this era where technology and entertainment are fused together.

Streaming platforms are a very contemporary phenomenon. Between 2011 and 2016, the subscription streaming services market in Europe grew by 128% annually (Grece, 2017). In the US, over half of all households subscribed to a paid streaming service as of April 2017, and Netflix had half of the country's household as its customers (Statista, 2017).
The takeover made by Netflix on traditional television has been fast and smooth. Since its launch in Europe in 2015, Netflix has continued its ride conquering new countries gradually increasing revenues and subscribers.
Netflix has legitimized a behavior that was being the new norm in the world of media consumption. Traditional television, with few channels and a limited offer, could not contain the need for a tailored offer and unlimited fruition of content. Through illegal websites, the streaming of content was already available on the Internet, causing incredible losses for the traditional media world. Netflix has been able to institutionalize online streaming, with a platform that allowed those new forms of media consumption that had been developing naturally over the years.

Streaming platforms are characterized by the fruition of content over the Internet. In the past few years a great number of companies have started untapping the realm of fruition of content. Streaming refers to the possibility of obtaining media via the Internet. Companies like Spotify and Apple Music have focused on streaming music, while Netflix has been the pioneer of Internet television. Netflix's interface allows the user to interact with thousands of

shows and movies immediately available. Streaming companies usually charge a monthly renewed subscription fees for the service provided while other companies, like YouTube and social media organizations, are funded by the advertisements inserted in the websites.
While traditional television did not have the instruments that allowed a precise tracking of the viewer's experience, streaming has created a new source of data for Netflix. Data influences the way the user interacts with the platforms and the same content that is created at Netflix. Data is the cause for most the decisions taken by the company and needs to be studied in tandem with the products created from as byproducts of the same data. These two worlds collide at Netflix and cannot be separated. Netflix is constantly changing because of its data, a never-ending quest for the perfect content.

The combination of media and data is at the very core of Netflix and it needs to be analyzed in depth. The technological skeleton in place at Netflix gives meaning to most of the content produced by the company. This area must be studied to understand the past and current behavior of streaming organizations, trying to hint at possible future paths.

In chapter 2 I'll proceed with a literature review on the main perspectives regarding streaming organizations. I'll present the main features of digital platforms in order to show the need for an analysis that would go beyond this framework, because of the special nature of streaming organizations. After an overview of Netflix's history, I'll use Amanda Lotz's framework to position Netflix in media studies, a needed perspective for a thorough understanding of the case.

In Chapter 3 I'll present my findings on the main technological tools used by Netflix to create enhanced experiences for its users, showing the connections between the technological core and media production.

In Chapter 4 I'll deal with the implications of the technological skeleton of the company for the creation of content. With the results of the empirical research I'll try to reveal the unanswered questions regarding the ties between data and media and the importance that these bear for future of the company.

In the conclusion I'll summarize the work and suggest future paths that the company could take regarding the intertwining combination of data and media.

Chapter 2

Technology companies are often studied as they were organizations alike, without acknowledging their differences. Netflix, like many of the recent phenomena out of the Silicon Valley, has been often labeled as a digital platform. Platform is the core term when it comes to describing the innovative structure of technology companies. Tech companies defy the rule of pipeline businesses characterized by economies of scale. Platforms consist of "*a new business model that uses technology to connect people, organizations and resources in an interactive ecosystem in which amazing amounts of value can be created and exchanged"* (Van Alstyne et al., 2016).

A platform business creates a competitive advantage based on a community of users and the output this community contributes to create. Usually platforms have four types of players (Van Alstyne et al., 2016) :

- The *owners* control the platform's intellectual property and governance.
- The *provider* is the platform's interface.
- The *producers* utilize the provider to create content.
- The *user* use that content at their enjoyment.

Pipelines and platforms are not mutually exclusive. A business could develop a strong pipeline business and create a technological platform to support it. This is the case of Apple with the iPhone and its Apple Store.

As highlighted by Van Alstyne et al. (2016) the change from a pipeline business to a platform business involves three main shifts in a company.

1) From resources control to resources orchestration. As noted earlier, in a pipeline the asset are both physical and intangible, like intellectual property. In a platform the real asset is the content created by users and creators. The management of this content-creation is the strength of the platform model.

2) From internal optimization to external interaction. While a pipeline focuses on improving its production and reducing its costs, the platform is dedicated towards attracting new users and increasing the interaction between them and the producers.

3) From a focus on customer value to a focus on ecosystem value. While in pipelines the ultimate goal of the process is to increase the value of the products for the consumer, in platforms the benefit of overall ecosystem is considered more valuable of the single customer.

The first differences between Netflix and traditional platforms can be highlighted here. The first statement is partly true in the company's area of expertise. Netflix manages the content created by third parties and connects them with the end users but it cannot be said that Netflix serves as merely of a manager in the interaction of users and creators, like YouTube does. Creators cannot upload their work on Netflix. The content must be selected by the company, which will then decide products to be streamed on the website. While platforms like YouTube can be regarded as orchestrators of resources, mostly invisible in the interaction between users, Netflix needs control if it wants to continue its dominion. In the streaming world resource control has to be preferred to resource orchestration because, in the end, the companies that will keep having increasing subscribers will be those with the best resources (shows and movies).
Regarding point 2, Netflix's purpose is external interaction indeed. The final goal is the increase of subscribers that will interact with more and, in the end, will drive up the revenues. The third point also goes against the idea that Netflix might be considered a digital platform. Netflix's ecosystem is formed by various actors, from the end user to the top executive of movies studio they licensed from. While striving for the wellbeing of the entire industry, Netflix wants to increase the value of the company *itself*, not of the overall ecosystem. This became clear when Netflix started producing original content. They stopped being a mediator between several players while becoming the source of content users had to come to for quality products.
While sharing some aspects of digital platforms, Netflix presents entirely new features never analyzed before in platform studies that need to be addressed.

I've already mentioned another important word in the digital platform narrative, which is *ecosystem*. A platform-based ecosystem is composed by two fundamental parts, a core and complementary elements. The platform is *software-based* and serves as a foundation for the other elements to operate. The other elements are complementary, they are add-ons or services that interoperate via platform and increase the value of the ecosystem. These types of

add-ons can be of very different nature, actual apps like in the case of iOS or books in the case of the Amazon-owned Kindle. In any case, these types of add-ons are complementary products to the platform. The more of one will increase the attractiveness of the other. In the case of the Kindle example, the platform will be more valuable when users upload a great number of books.

Apart from the central elements, the ecosystem has three other features (Figure 3):

> *end-users, rival platform ecosystems, and the competitive environment in which they exist. End-users are the collection of existing and prospective adopters of the platform. The characteristics and diversity of this market evolves over time and as industries converge and split. A platform ecosystem exists within a larger competitive environment, often competing with other rival platform ecosystems.* (Tiwana, 2013)

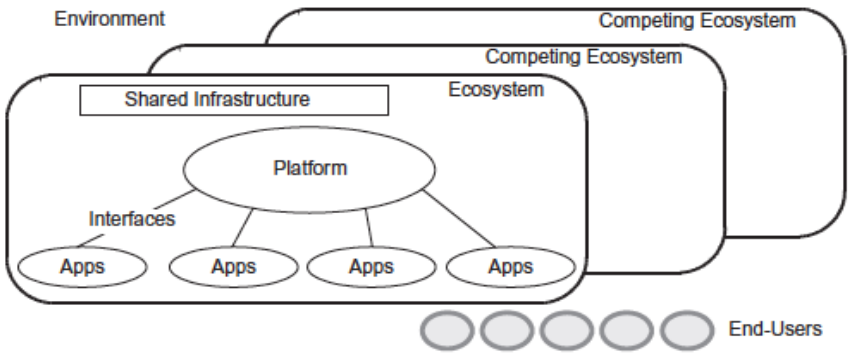


Figure 3 (Tiwana, 2013).

In the ecosystem of Apple developers of mobile applications are external to the company but they can upload their products on the App Store, being then available to iPhone users. The ecosystem is a vital concept for the platform discourse because it's this last group that contains all the elements that share the benefits of the platform.

The ecosystem concept in certain ways is also applicable to the case of Netflix and streaming platforms. Netflix's ecosystem is formed of many actors. The company :

> *licenses content from multiple suppliers. It bids for exclusive rights to SVOD rights against cable and broadcast networks and online suppliers, typically buying multi-year exclusive SVOD licenses. At the time of renewal, it evaluates viewing, as well as number of similar titles, to determine whether it will rebuy and how much it is willing*

> *to pay. Payments are fixed and not scaled according to number of subscriptions or viewership figures* (Fagejord et al., 2019, p. 171).

One of the most important actors of the Netflix ecosystem are traditional and cable networks. These actors, especially in the early days, where the main providers of content to the platforms. With Netflix as a distributor of content, networks and movie studios were fueling the platform with the content to be streamed to the end users. This was the ecosystem of the first few years of Netflix and resembled indeed those of other tech companies. *As Netflix started gathering more and more power into its center, producing its own content and therefore excluding external actors from its ecosystem, the company kept distancing from the notion of platform*.

Network effects

One of the features of platforms are *network effects*. In the case of a company like Uber, the software works as a match-maker between riders and drivers. The more riders use the app the more the serviced becomes attractive for the all ecosystem. These types of relations are network effects. They represent the impact of new users on the overall system. *Positive networks effects* represent the idea that a larger number of users will generate a big benefit for the platform, whereas *negative network effects* refer to the chance of a growth that may have negative effects on the system.

When Facebook started its business the platform had little value. One hundred people using the platform did not increase the value of the all system but every new user increased dramatically the positive network effects of the platform. Once these effects take place, they increase exponentially the number of interactions in the platform and the value of the platform itself (Figure 4).

In the case of negative network effects the overall value of the ecosystem is diminished if we add more users to it. If one household is connected to the Internet network of the neighborhood it may cause decrease in the speed of the connection for the other users, hence the negative network effect.

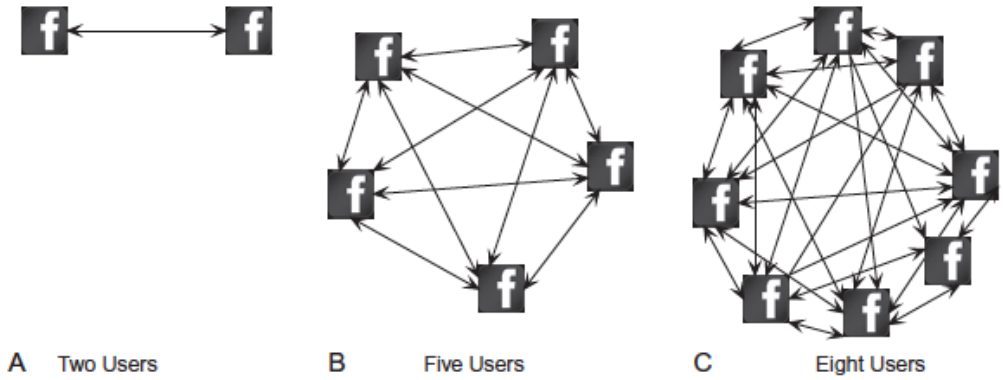


Figure 4 (Tiwana, 2013).

Network effects shape the very core of platforms. The importance of these processes has contributed to the change from supply economy of scale to a demand economy of scale. Historically, companies have scaled up their business through mass production and production efficiencies. If a company produces large quantities of a product then its costs will decline accordingly. These has been the central concept for the incredible progress which has shaped the past two centuries.

The incredible development of technology that has dominated the first two decades of the 21st century has seen the rise of the concept of demand economy of scale where the " *[…] efficiencies in social networks, demand aggregation, […] make bigger networks more valuable to their users. They can give the largest company in a platform market a network effect advantage that is extremely difficult for competitors to overcome*." (Van Alstyne et al. 2016, p.19).

There are four types of network effects. In a two-sided platform, where we have two main groups of players, the effects generated by the increase of users can be *same-side* or *cross-side*.

In the matchmaking app Tinder, the increase of users in the platform due to the quarantine in the Covid-19 crisis dramatically increased the appeal of the platform for other users on the same side of the platform.

Cross-side effects arise when an increase in consumers or producers in the platform causes a positive or negative effect on the other group. If Uber witness a consistent reduction of drivers, the riders will be deeply affected because the waiting time will increase. The cross-side effects could lead to different consequences compared to same-side. Due to their

asymmetrical nature, they could lead to imbalances between the two sides of the platform and eventually could have negative effects.
Even though Netflix resembles platforms very much, having a technological nucleus as its center, we find here another important difference with standard platforms like social networks. We cannot find same-side network effects, as an increase in users does not affect other users. For example, when Netflix was introduced to Europe in 2015 the American customers did not benefit from it. Here lies a fundamental difference that makes Netflix another type of *beast*. It defines a more static type of organization, that does not generate same-side network effects. Even though traditional same-side network effects are not present around the Netflix ecosystem, it must be said that spillover network effects can be identified by the benefit where the participants in the network benefit from interactions that they were not personally involved in through better programming and more accurate recommendations. Traditional network effects are not present in the Netflix ecosystem. The increase in tv shows and movies will benefit the users, that will view the company as more appealing. This effect, reminds of traditional one-side retail platforms, of which Netflix is an incarnation in the streaming era.

Data and Platforms

Netflix differs from traditional platforms but an analysis of the company cannot be made without considering its deep core of technology. One of the reasons why streaming organizations have been paired with traditional platforms is their nature, with data at its core. For this reason the main theoretical frameworks regarding data and platforms needs to be addressed before analyzing the empirical implications that data have at Netflix.
In order to understand technological companies, we have to understand data, being at the center of every company utilizing a tech interface. For tech companies, data become a creator of meaning. Data influence the development of platforms and their path to be taken to increase revenues. Data is at the very center of these companies. In fact " *data emerge as key carrier of value but also as the cognitive medium on the basis of which links between ecosystem participants are forged"* (Alaimo and Kallinikos, 2019, p. 43). The importance of data goes beyond the mere technological tool that facilitates the operations of companies but

becomes a conveyor of value, an active participant in the creation of the meaning of the organization. An actor more than tool, a shaper of the practices of organizations.

Data has been shown (Alaimo and Kallinikos, 2019) to have had a significant impact in the growth of social media platforms, a transformative element that creates new market possibilities for companies. Data complementarities enhance the strengths of platforms, in fact

> *the processes through which different types of data are made to matter, related and combined are anything but trivial. They require establishing the practices that generate data of a certain kind and format […] and assembling together different data in more complex services […] developing the functionalities that support these practices […] and the technology and systems (not simply algorithms) through which these data are handled, exchanged and more generally, made commercially relevant.* (Alaimo and Kallinikos, 2019, p.43)

The fundamental nature of data for organizations like social media is the very core of their business model. Platforms need to encode human behavior in order to translate it into quantifiable data. They need to channel user's behavior into preordained activities that will allow the organization to harvest the most information. Netflix has followed the path of companies like Facebook by rendering human activity into big pools of classifiable data. The ability of encoding human behavior and gathering it is the most innovative aspect of platforms and have been the catalyst of the success of such organizations. The work of Alaimo and Kallinikos (2016) highlighted the main types of data that are rendered in social media organizations and their different value in the data-gathering ecosystem. There are three main groups of data: *profile data, behavioral data* and *user-generated data*.

> Although social media produces different kinds of social data, not every type of data produced has the same value. Descriptive data about individuals (profile data such as name, gender, occupation, marital status, location, etc.) makes sense and obtain value against the constant quantification and qualification of behavior-related data produced by social media programmed activities. Behavioral data is obtained by encoding the highly structured participation social media embeds. The various activities that occur on these platforms such as, for example, the reiterated 'clicking', 'sharing', and 'liking' that users perform on Facebook and its connected applications, constitute a real time, all-encompassing encoding of everyday activities which has no comparison with previous data sources on individual and group behavior. Another type of data, user-generated data

> (commonly referred to also as UGC – user generated content) provides a huge quantity of unstructured data (in the form of images, posts of various kinds and written comments) that is very often just stored into social media databases but seldom put into direct use. On the one hand, UGC seems rather to provide the means and the context by which user behavior — the constant 'uploading', 'sharing', 'commenting', 'liking' — can be performed and encoded as recurrent patterns of action. […] Behavior-related data, the by-product of online social interaction and participation thus, appears to be the most valuable source of social data and the most distinctive contribution that social media brings to big data: the constant monitoring and recording of user daily interaction and participation. (Alaimo and Kallinikos, 2016, p. 7)

The research on the relevance of data in social media has opened the vault and allowed us to better identify the core of platform's business. While this classification is true mainly for social media, it serves a blueprint for other organizations like Netflix that make of data a central aspect of their operations. While the UGC remains only related to social media platforms, the profile and behavioral data are the battleground of organizations like Netflix. There is the need for a more precise identification of the main types of data being extracted at Netflix. They need to be defined more analytically in order to understand the deep relations they create with the culture and the media.

A relevant element to data-centric companies is *tagging*, the core activity of platforms. Tagging is the central activity of platforms because it allows to connect the user with a certain object, ultimately creating a personalized profile of that user. Tagging is fundamental for every company that is supported by data-rendering. In Alaimo and Kallinikos (2017) it is shown how the tagging activity is fundamental in online shopping, but the reasoning can be expanded to almost every platform. Once the system tags a user to an object, it creates a strong connection which is the basis for a creation of a preference profile of that user, that becomes an aggregation of tags.

Tagging is useful not only to create a mathematization of the taste of a single user, but it can group users according to their similarities in terms of tags. To those users are recommended the same items, posts, movies. In the social media world the "following" function (Figure 4) allows the system to link the tags of two different users, creating a group of users that, allegedly, shares the same tags and tastes (Alaimo and Kallinikos, 2017).

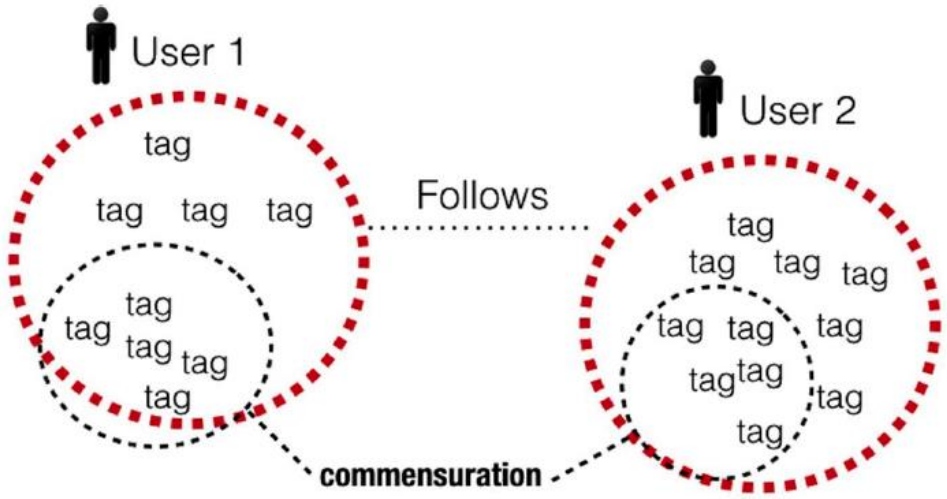


Figure 4. Source : Alaimo and Kallinikos, 2017.

This idea of user clusters is shared by many platforms, the fastest way toward the goal of computation of taste. In previous analyses of Netflix, the customer clusters approach was said to be used to group users that shared similar tastes in movie consumption. In the early days of Netflix, users could rate movies and they were clustered together accordingly (Alexander, 2016). Tagging and clustering serve the fundamental purpose of creating groups of users that are the subject of mathematical organization and relation.

> Aggregation is a core operation, a fundamental passage in the chain of data computations of social media. […] Aggregation may take various forms but all these forms maintain the core function of assembling scattered data into entities, such as sets, matrices, or clusters that can enter into mathematical, statistical or other kind of quantified relations to other entities. […] Aggregation creates entities (users, groups of users, etc.) that have no equivalent in the traditional, socially-embedded social interactions. Such entities nonetheless acquire a fundamental functional reality insofar as they afford the computability, commensuration and fungibility of widely different things. By means of aggregation, the differences between an individual and a collective are transposed into numeric relations, since everything defined as aggregation of data (a set, a cluster, a matrix) can enter into some computable relation, without regard for the volume of data. (Alaimo and Kallinikos, 2019)

The analysis of categories in the company Last.fm by Alaimo and Kallinikos highlighted the commonalities that music and video streaming platforms share when it comes to developing

categories of similar items that can are associated via tags of users. The creation of personalized genres of music or movies is a common feature in these organizations, in fact "*these categories emerge as a common currency that effectively coordinates user interaction online and the organization's encounter with users and other stakeholders" (*Alaimo and Kallinikos, 2020). Every platform needs to create its own categories of similar items, through the encoding and harvesting of the behavioral data of its users.

The journalistic research made by Madrigal in 2014 revealed the tagging system used by Netflix to label movies, in order to create personalized genres that would target specific groups of users. Madrigal's work is of fundamental importance for an analysis of Netflix because it casts light on the connection between data and media that is the focus of this work. Tagging movies has allowed Netflix to create groups of users to be targeted with the same content. The library changing according to the cluster the user belongs to.

The detailed work made on tagging scratched the surface of the deep relation between data and culture in place at Netflix. The work of Madrigal was influential and set the path for further analysis of this relation. However, there is a need for a deeper research that would pair the influences of the technological evolution on the cultural output that came out of Netflix.

In social media and platforms this process of encoding of data and subsequent clustering serves the purpose of creating a personalized version of the platform, a tool that will enhance the experience of the user. The data that is gathered by platforms is fed back to the users in the form of recommendations that vary according to the case analyzed. The recommendation is a symbol of the switch in the capitalist society from mass-consuming to niche-consuming. The recommender feeds the user with products that are specifically targeted to his tastes, at least to the rendered version of his tastes. The recommender system, ubiquitous in our digital life, is *" more than a technical response to the ubiquity of data that characterize our age. It is above all an organizational practice that seeks to modulate a space of interaction between organizations and users or customers in an economic, cultural and social context that is increasingly marked by the fragmentation of consumer needs and the individualization of consumption"* (Alaimo and Kallinikos, 2019). The recommender is the sign of the shift from the capitalist world of the Ford Model-T to a new era of products tailored on the end consumer. In the world of media, Alexander (2016) has argued for a pessimistic view of the recommender system in place at Netflix. She sees the mathematization of taste as a loss of control on our cultural choices, now in the secure hands of artificial intelligence. While I perfectly understand the fear of not being able to independently choose a movie because

something else already chose for me, I think that the recommender should be evaluated more neutrally in order to understand better its deficiencies and elaborate possible improvements of this powerful tool.

Before delving deeper into the media analysis of Netflix, I want to point out the extent to which media and technology have been linked and the power this connection generates. Media technologies are able to both constrain and facilitate communicative practices and preferences, and thus essentially provide base structures and parameters that regulate the production, distribution, and consumption of content. The development of these technologies emerges from, and is shaped by, social processes, hence reflecting the deep connection between the two (Napoli, 2013).
Algorithms can be characterized similarly, in terms of the extent to which they have the capacity to structure user behaviors, impact preference formation, and further content production decisions through mechanisms that are technological in nature but are developed and frequently refined and recalibrated within complex social processes.
Non-human actors, like data and algorithms, interweave on equal footing with human actors to affect social conditions. This point of view allows us to understand once more the complex intermingling of human and non-human actors. The perspective of Napoli serves the purpose of drawing power dynamics in place between technology and media organizations. The one thus cannot live without the other. Data is derived by social practices and in turn influences those same practices, contributing to modification of behavior and creation of content.

In the next paragraph I'll highlight the differences between Netflix and traditional platforms, using the concept of "portals" introduced by Amanda Lotz. Netflix has brought ground-breaking changes to the world of television and cinema. This is where this particular organization has evolved, becoming the market leader of the new entertainment world. In a continuous tension between a media and a technology company, Netflix has changed the way we approach culture and therefore needs to be analyzed in depth.
From the analysis of the media aspect of Netflix, we'll jump to the research of the technological and cultural traits of the company, trying to understand how a recommender system shapes the movies and television shows we watch every day.

2.1 Netflix

Platforms have shaped the first decades of the 21st century. They changed the way we perceive the world around us.

Youtube, the online video-sharing platform, is an emblematic platform. Its flatness and openness make it the perfect and the first-ever union between media and platform organizations.

Youtube has always championed user-generated content, presenting itself as the ultimate egalitarian platform. This is a central aspect in the platform discourse that has not been stressed enough. While companies like Facebook and Youtube try to sell themselves as technology companies, behind the term platform, they have gradually become strong media companies that shape our society. The neutral standpoint, derived from the original idea of a platform as just a technological hub, is long gone. When platforms have user-generated content as their main feature, far from being neutral they *" shape the communications, interaction and consumption they facilitate – through interface design, moderation policies, terms of service, algorithmic recommendations and so on* " (Lobato, 2019).

The rhetoric of the platform places YouTube as a facilitator, an idea that fits perfectly with the populist appeal of the hub as the ultimate supporter of egalitarian and user-generated content.

Actually, such companies could be seen as "patrons" controlling at least part of the content that is generated and shared in their domain. In fact, "*YouTube and Google have pursued a specific business model that, while it does not force them to emulate the traditional gatekeeper role of broadcasters and publishers, nevertheless does have consequences for what they host, how they present it and what they need from it*" (Gillespie, 2010, p. 358).

The active interventions of such companies in the content that is created causes a major change in the cultural discourse that is shaped by those same platforms. Gillespie, in his " The politics of 'platforms' ", highlighted for the first time how (social media) platforms are becoming the gatekeepers of the internet culture.

The conclusion of the paper is revealing:

> *Despite the promises made, 'platforms' are more like traditional media than they care to admit. As they seek sustainable business models, as they run up against traditional*

> *regulations and spark discussions of new ones, and as they become large and visible enough to draw the attention not just of their users but of the public at large, the pressures mount to strike a different balance between safe and controversial, between socially and financially valuable, between niche and wide appeal. And, as with broadcasting and publishing, their choices about what can appear, how it is organized, how it is monetized, what can be removed and why, and what the technical architecture allows and prohibits, are all real and substantive interventions into the contours of public discourse. They raise both traditional dilemmas about free speech and public expression, and some substantially new ones, for which there are few precedents or explanations.* (Gillespie, 2010, p. 359)

As certain platforms have become more similar to traditional media companies, the distance between platforms and the media-entertainment industry has vanished. A new giant has risen in the past few years that seems to place itself in the platform economy but does not quite have the same features of social media organizations or operative systems like Google Android or Apple iOS. This company is the streaming giant Netflix.

History of Netflix

Netflix was founded in 1997 by Marc Randolph and Reed Hastings. In its early days the company positioned itself in the DVD-rental business with an innovative twist. The company sent DVDs directly to the homes of its customers saving the trouble of going to the actual Blockbuster, the DVD-rental company that shaped the 90s. Blockbuster was the leader in DVD-rentals and the story of the birth of Netflix involves its predecessor.

The “stream” began when CEO Reed Hastings had rented the film “Apollo 13” for too long and had to pay 40$ in overdue fees. That’s when the idea came to his mind of a rental service that erased the late fees and provided customers with the hassle-free process of receiving movies directly at home. The early days of Netflix had the main focus on the distribution aspect of movies, but its leaders had already in mind the path that was needed in order to shake the whole entertainment industry.

As we’ll analyze later, U.S. television had been organized hierarchically since the Second World War with Networks first and Cable then. The long-term mission of Netflix was to decentralize the vertical world of American television and film and bring the entertainment closer to the final user.

In 1997, Netflix's offer was similar to its rival Blockbuster (producthabits.com). With a 7-day rental policy, customers could rent movies for only 50 cents and the initial library was of approximately 900 titles. With the catalogue expanding, in 1999 it was introduced the first subscription plan with possibility of renting an unlimited number of movies every month by paying a fee of 15.95$ (Figure 5).

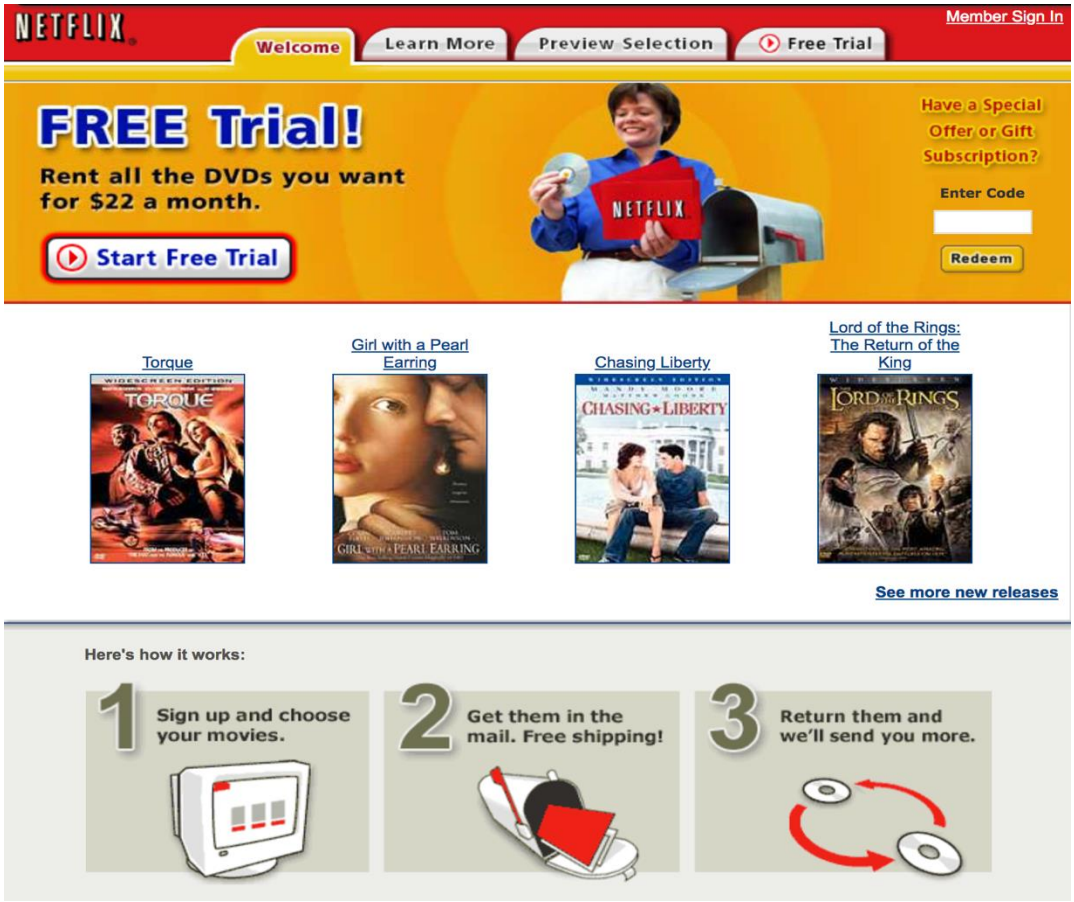


Figure 5.

In the subsequent years Netflix increased its subscription base, with effective tools like "free trials". Most of the users remained with the company after the end of the trial even if the pricing of the subscription was discreetly high. The initial strength of Netflix was based on the convenience of such a service that relieved the customer from late fees and delivered the DVDs directly at home.

In the first half of the 2000s the company started developing another feature that would become of central importance in more recent times. The **CineMatch** algorithm was

introduced allowing the customer to find better movies and not waste his time in a bad rental experience. This first iterance of the algorithm will help defining the future of Netflix as more than a distribution company but of a media company that is closer to the user and more horizontal.

In 2007 Hastings took the bold decision of focusing the future of the company in online streaming. This was a time when watching movies with Internet Explorer was still a painful process and Internet connection was still quite slow. The CEO decided to go on with his idea even people started thinking that online streaming was a lost cause.

The years between 2007 and 2013 were quite tumultuous for the company and the revolutions that started in 1997 seemed to falter. Many users canceled their subscription because of a few bad moves. Nevertheless, the management kept investing time and energy in getting more content on the platform.

The year 2013 was the turning point for Netflix, when the shape of the company of entertainment world changed for good. The symbol of this change is the show *House of Cards*. This series was the first hit of the Netflix Originals and the first of a long list of original content created by the Californian company. Netflix stopped merely being a distribution company and became a media conglomerate that creates and distributes proprietary content via its platform. The following year saw a huge increase in subscribers that fueled the creation of a never-ending list of original shows. In 2015 Netflix produced its first movie, *Beasts of No Nation*, preparing the field for its venture in film production. 2016 saw the launch of the company worldwide. From an American company, Netflix became a media organization having huge influence on both the local and the global scale.

A closed portal

Throughout the years Netflix changed from being a linear business to something new and very similar to platforms. In 1997, the company stored DVDs in warehouses and sent them to its customers. Back then the company did not have any revolutionary feature in terms of its structure. With the development of the algorithm, the purpose of the company became creating more value for the end-user by tailoring its offer of movies and tv shows. Netflix became partly a platform business, because it managed to match the users with their preferred content and did not thrive by acquiring assets but by connecting more subscribers within their networks (Fagerjord et al., 2019). However, if we compare Netflix to the usual companies

that are the subjects of platform studies, like Facebook and Youtube, we notice how the company from Los Gatos differs a great deal. In fact, Netflix does not have the same open and collaborative structure of social media platforms. There are no features that allow the sharing of user-generated content and there is no way of uploading content or create software application that work on the platform. Also " *it is fundamentally different from video sites containing both user-uploaded and professionally managed content […] Netflix does not (at this stage) have the character of a multisided marketplace like Amazon or Ebay"* (Lobato, 2019, p.36).

Netflix differs from classic platforms because it is fundamentally closed and professional. Its closer to the end-user but does not open itself to him. It remains library-like and professional, " *a portal rather than a platform*" (Lobato, 2019, p.37). The company needs to be studied with a novel perspective that would merge the portal-like aspect and the technology part that has always been associated with platform companies.

History of TV. From Pipeline/Network to Post-network/Portal

An analysis of the U.S television industry will be presented to better understand how Netflix's impact contributed to the change of the entertainment industry. Even though the U.S. example could be considered a simplistic approach considering the global analysis, it is a fair approximation and its path is similar to other countries.

The traditional television revolved around the television set, a unique element in post-WW2 households. Families gathered around this sacred object to watch their favorite shows broadcasted by the three main networks: NBC, CBS and ABC. This was the so-called **network era** (Lotz, 2014) that rose from the ashes of the Second World War. Network era television was characterized by the power of the three networks that controlled every cultural broadcasting until the 1990s. A network was organized hierarchically much like a vertical business organization. The output of the network was linearly scheduled around a specific timetable every day. Even though the output of the networks were cultural products, the similarities with pipeline organizations are many. The products were carefully designed inside the network and broadcasted in prime time. The process was extremely linear, from the company straight to the homes of millions of Americans. During this era, the viewer had little if no control on what he was watching. The remote control did not exist yet and the choice of channels was very poor. This was the time when television was a mass medium, when its

cultural impact touched every member of society and its programs were created to appeal to as many people as possible.
In the 80s and 90s new channels were created, like Fox, WB and UPN. The introduction of new technologies like remote control and VCR increased the possibility of choices the viewer could make. Cable Television was born. Now viewers could pay a subscription every month for premium tv programs. These events shaped the transition from the network era to the **multi-channel era**.

> Because of the limited options of the network era, programs were widely viewed throughout the culture, but the explosion of content providers throughout the multi-channel transition enabled viewers to increasingly isolate themselves in enclaves of specific interests. […] Instead of needing to design programming likely to be least objectionable to the entire family , broadcast networks – and particularly cable channels- increasingly developed programming that might be most satisfying to specific audience members. (Lotz, 2014, p.27)

During the 90s there was an opening in a system that for many years was closed and vertical. The linearity of TV started shaking. Companies started responding to the needs of every sub-group. Niches audience started becoming an important part of the business. As different channels catered to different needs, television started the path towards mass customization that is reaching in the present day.
Lotz was the first the develop the idea of **post-network era** television. The idea that the television as we know it would die is a concept well overstated. In the post-network era that has started a few years ago, television has simply changed its features. The power that channels had in the past decades has been eroded and the vertical networks that dominated the culture have left the power to different types of organizations, more open and collaborative.
For the viewer, the ability of choosing programs and shows kept increasing with the arrival of DVDs and new channels. The new technological innovation was the internet, with its potential more developed the streaming revolution hit the world of entertainment and changed it forever causing the passage to post-network era television. The main characteristic of this new era is post-linearity. Streaming has allowed users to access their preferred content in every moment, breaking the linearity of television programming that became a stable feature of the system since the 1950s. Now I can watch episodes of *House of Cards* whenever

I want without having to wait, let's say, Thursday at 9pm. Netflix has been the main player that has brought this radical change into our everyday lives.

As pointed out, an important aspect that has contributed to these changes is the relationship between the viewers and the organizations and creators of contents. Viewership, from homogenous and mass-like, has become fragmented and polarized into smaller niches. The possibility for companies like Netflix to use the data at their disposal for the creation of content has increased the opportunity for *mass customization* of their services. The flow of data, due to the new technologies that have transformed television, has shaped the very organizations that create and produce the content. The data has contributed to break the verticalization of the network era and turn entertainment into a more horizontal and dialogical system.

Production components	Network era	Multi-channel era	Post-network era
Technology	Television	- VCR - Remote Control - Analog Cable	- DVR - Portable Devices - Mobile Phones - Tablets - Digital Cable
Creation	Deficit Financing	- Surge of independents - Conglomeration and coproduction	- Multiple financing norms - Opportunities for amateur production
Distribution	- Bottleneck - Definite windows - Exclusivity	Cable increases possible outlets	- Non-linear access - TV everywhere
Advertising	30-seconds ads	- Subscription - Experimentation with alternatives to 30-second	Multiple-user supported model-transactional and subscription

Audience Measurement	- Audimeters - Diaries - Sampling	- People meters - Sampling	- Cross-platform - Big Data

Figure 6. Revised from Lotz (2014).

Portals

The post-network era became reality thanks to the development of internet television, with content accessible at any time and place. Netflix became the main advocate for a new era of entertainment and has done so by revolutionizing the way media companies are organized. The platform that Netflix incorporates has allowed this revolution to take place and symbolizes this new age of streaming.

As said earlier, even though Netflix somehow belongs to that category of social media platforms and "matchmakers", it cannot be considered a player in the same league. Netflix is more like a **portal** (Lotz, 2017), a huge catalogue of content accessible by the user at will. The main characteristic of a portal like Netflix is *curation* rather than *scheduling*. Breaking the rules of traditional television has changed the way companies create their content. It does not have to fit a daily schedule anymore but has to answer the needs of every niche audience present in its subscription base. The CineMatch algorithm that was introduced at the times of DVD-mailing has evolved to target multiple taste group, creating millions of different versions of Netflix and producing a mass customization of the service. The company then:

> Varying from the niche strategy of several portals then, Netflix pursues a "conglomerated niche" strategy. The company services multiple audiences, but this is very different than a "mass" strategy. It does not license or develop a series with the expectation that all Netflix viewers will value it, but develops offerings with distinct segments of subscribers in mind. Such a mass customization strategy is made possible by the elimination of the time specificity and capacity constraint of linearity that prevent channels from effectively targeting multiple audiences to achieve scale. The network era comparison for Netflix is not a channel, it is a conglomerate; Netflix is not Nickelodeon, it is like Viacom. (Lotz, 2017)

Netflix then manages to grow bigger in scale without focusing on a specific target group but targeting every possible group. The tool for achieving these almost antithetical goal is the technological asset that allows Netflix to increase its subscribers.
The company builds its conglomerate-niche strategy via *selection* and *satisfaction* (Smith et al. 2016). The platform, providing tv shows and movies in a matter of seconds, has great accessibility for the user guaranteeing a wide selection of products. The satisfaction of the viewer is enhanced via the huge amount of data that flows into the servers of the company and allows it to produce more user-friendly content.

Subscriber-funded portals

Portals have eliminated the need for an advertising-based television system, even though it remains popular for the traditional industry. The library of content is made available to the user upon a payment of a monthly subscription fee, much like magazine subscriptions popular years ago. The difference with magazines and linear subscriber-funded television (HBO) is the array of content that is available for the user. This concept is called bundling. A collection of goods will generate major value for users compared to single goods (Bakos et al., 2000) like in linear television, both network and cable. Bundling creates economies of aggregation where the services that bundles more content is preferred to the others. Bundling is also incredibly beneficial for Netflix because it allows the company to gather huge amounts of data. The bigger the library, the better for Netflix because it can expand their *data mining* on its subscriber base.
We can illustrate a model for portals like Netflix, which is useful to identify the main characteristics (Figure 6) of the new players in the entertainment industry.

Central function

Netflix's central function is *curating* the content that is bundled in the platform. As we have seen, the switch to non-linear television has made the curation of content more important than scheduling. The content has to be presented in the most accessible way so the user's value is added, having both accessibility and a big library of content.
In the past years, Netflix's focus has covered the *creation* of original content for its platform/portal. The importance has switched to the duration of the rights for a certain

show/movie long after its distribution deal expires. The success of Netflix has led to the creation of several portals, alongside traditional forms of entertainment. Companies like Disney, with an intellectual property developed in decades, have launched their own streaming platform to exploit the rights for their original content. To avoid the reduction of its library due to the fleeing of content, since 2013 Netflix has been producing original content that will remain on the platform forever.

Key strategies

The central strategy for Netflix is the exclusivity of its library. As of now, Netflix offers mixed content, originals and production owned by another company that will be licensed for a limited amount of time. Since 2017, we have seen the creation of other streaming services like Disney+ and HBO Max. The competition between Netflix and the other companies will be more based on the exclusive content they can offer, with an increasing number of content pumped out to generate a bigger library. Even though the surplus of content may guarantee a continuous variety for the user, the increasing number of services and subscriptions will make the battle for exclusive content more harsh.

The idea of portals creates a new theoretical framework for the analysis of streaming organizations and it's the first step in the process of a synthetic combination between media and technology. Netflix's identification as a portal creates a new framework that goes beyond the idea of streaming organizations as platforms, narrowing down the area of analysis. Nevertheless, the media framework needs to expanded with an analysis of the technological backbone in place at Netflix to a have thorough comprehension of streaming organizations. Being at the forefront of the media and technology world, Netflix needs to be addressed accordingly. My goal is to lift the curtain on the technological skeleton of Netflix to reinforce the idea of the portal while highlighting its technological roots. A closed, exclusive library rather than a platform where technology is nevertheless at the center of the equation, a fundamental tool that allows the creation of personalized content for its users.

Uncovering the technological underpinnings will allows us to understand the development of shows at Netflix. One of the main questions of this work will be related to the understanding of the link between tech and media. How did the technology influence the creation of shows

and movies ? How did technology changed the viewer experience ? What is the future of entertainment and why is it linked to data-harvesting ?

Data, algorithms and recommenders create the portal and the culture of streaming. They need to be understood in order to comprehend the impact of streaming on our culture. Netflix changed the way we look at television and entertainment and its technology was the main carrier of this change. Highlighting the main personalization techniques in place at Netflix will better define the role of Netflix as a streaming portal, where technology and data are the tool that have allowed the company to become the leader in the contemporary entertainment world while changing it for good.

In the next chapter I'll present my findings regarding the analysis of the technological structure in place at Netflix. This will lead to us to understand the influence of data and technology on the shows produced at Netflix, while delineating a path for the future of streaming organizations.

CHAPTER 3 – Recommender at Netflix

The role of Netflix as disruptor of the media world was fueled by its technological skeleton. The streaming era is shaped by the algorithms that create novel ways of presenting content to the users and ultimately influence the creation and development of this content. In this chapter we will see a few of the techniques employed at Netflix to shape the viewing experience, a dramatic change from the traditional viewing that has changed entertainment for good.

Research Design and Methodology

My research focuses on the case of Netflix. My goal is to analyze the streaming giant in order to understand where the company stands in the discourse between technology and media. The aim is clarifying the positioning of Netflix among fellow organizations. There hasn't been a clear identification on where streaming companies stand in this digital age, that blurs traditional labels reserved for organizations. Netflix has been very often associated with traditional platform companies because of its fundamental technological core. But I think this idea ought to be combined with an equivalently thorough investigation of its positioning in the media and cultural world. The realms of organization studies and media studies have separately generated bodies of work regarding the theme of streaming organization but there is a need for an analysis of the close link between the datafication of organizations and producers of culture like Netflix.

For my research I have chosen the case study (Yin, 2009) since I would be dealing with contemporary events that have been shaping our culture in recent years. Analyzing Netflix cannot be done without the wider context of the technology and entertainment, being the impact on the culture the main reason this work has been done. For this reason I deemed the case study the most appropriate method of research.
The case of Netflix has been chosen for its particular role of pioneer in the synthesis of the worlds of data and media. Conscious of the limitations of a single case-study, the role of Netflix in the modern media landscape makes it a rare case in the streaming world. Netflix's

streaming platform is a forge of continuous stream of original content, unparalleled in other organizations. It has an active role in the streaming world as active creator of content that is yet unattained by other companies. Furthermore, Netflix's specialty is given by the importance given by data in the company's decisions, an aspect that has not been fully developed by its adversaries and that still has unexplored areas in the company. Netflix is a unique example that can show the dependent nature between media content and technology. At Netflix the algorithms constantly change the shape of the company, creating a different experience for every user. Technology makes Netflix an incredibly dynamic company compared to other streaming platforms like Amazon Prime or Disney+. Netflix is not merely a company that uses technology to distribute content. At Netflix the technology *becomes* content, shaping the narratives of its shows and of its corporate decisions.

The data that I have collected could have been found only at Netflix, where interface and content is constantly updated to customize according to the users' needs. To understand the way content and technology merge, creating hybrid, the case of Netflix remains an outstanding rare example.

The intertwining nature that takes place at Netflix simply does not yet exist in other organizations and therefore an analysis of the combination of tech and culture needs to be focused on the single case of Netflix.

The case of Netflix will be analyzed in a global perspective, since sub-units were not shown while collecting the data. The holistic approach has been helpful because the goal of the work was to analyze the influence of the technology in the entertainment world in its totality, without focusing on specific areas of the company.

By analyzing the algorithms and data-harvesting processes in place at Netflix and their connections with the products, I want to highlight Netflix's positioning in today's society. I would like to find the place in the spectrum that goes from tech company to traditional media network. My idea is that this traditional labels are becoming substituted by new companies that embed both natures.

The goal is to find theoretical generalizations from practical findings in the analysis of such case (Yin, 2009). The favored outcome of my work would be the identification of the link between data and entertainment in shows and movies where data-collection is one of their main features. Netflix is the largest streaming portal and the outcome of the study could lead to generalizations applicable to other streaming organizations as well. My prediction is that content and entertainment-related experiences will become more and more connected with

data-harvesting strategies. Technology has completely changed entertainment companies, from networks to incredibly powerful portals. My goal is to show how data has allowed Netflix to concentrate power into its hands and transform from platform to portal, with technology at its core. The refinement of technological processes has led to the inseparability of shows and data, changing the viewing experience.

The data collected will allow us to better place Netflix regarding its nature of tech and media company. An analysis of the algorithms and big data techniques will define the influence of data on media, how the data-gathering influenced the actual development of shows and movies. Understanding the place of Netflix in the discourse between media and technology companies will allow us to understand the impact of technology on the cultural products that Netflix generates.

I have collected data mainly from online sources. Of utmost importance were the documents written and released by Netflix data scientists in their blog. I collected most of the entries from the Netflix Tech Blog, dating back from 2012 until 2019. Since the documents were not in a huge number, I have been able to read them all while making sure of their reliability. The main portion of data came from online sources directly connected with Netflix. I have collected the data from well-known engineers that worked directly on the projects that will be mentioned in the subsequent pages, in order to avoid any issues of reliability. I have gathered several snapshots of the Netflix interface for one user, in order to cover all the relevant algorithms that shape the user experience. These empirical data have been helpful in

I have also analyzed recorded presentations of Netflix engineers, gathered to understand the most recent debate on the developing ideas around the company. They have helped me to delineate the path taken by the company in the progressive shaping of users tastes and creation of cultural products. I have also used external documents and data from tech blogs in order to a have a non-partisan perspective of the company and its development.

Behavioral data

At Netflix, the viewing habits of the users are channeled in codified way much like Facebooks does with our “virtual social life”. In the social media platform our communication is simplified by the likes and follows that encode our social data. On Netflix

the fruition of content, the behavior of streaming portals, is encoded in viewings and likes. While the content is different, the stylization of the behavior is the same (Figure 1).

FACEBOOK VS NETFLIX BEHAVIORAL DATA

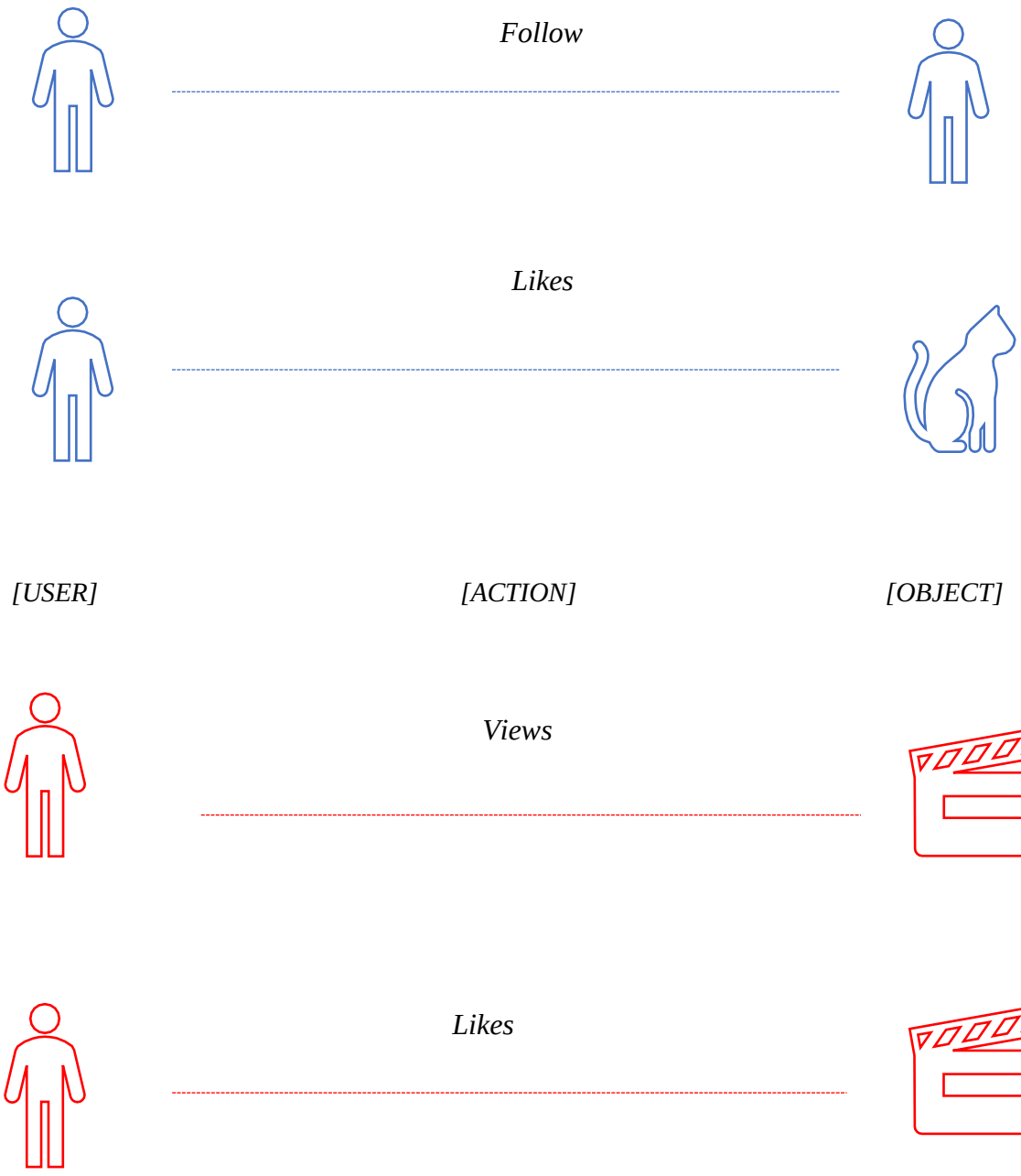


Figure 1. Revisited and added from Alaimo and Kallinikos (2016).

Our online behavior has been simplified and encoded since the early days of Google. Users are their searches and nothing else. What we search defines our activity online. The codification of behavior allowed Google to collect tons of data then sold to advertisers. Social media have been able to refine the codification of behavior, furthering the study and depth of our behavior. Once encoded, the data is used to rewire the viewer's experience and understand better his online behavior. The era of codification of behavior started with Google, was expanded by Facebook and was specified for the entertainment business by Netflix.

Social media platforms and portals create the connection between users and the objects of their interest. The study and elaboration of the behavioral data is a main focus for Netflix employees. The behavioral data of "views" and "likes"(it substituted the former rating system) is the raw matter that is served to the algorithm to recommend the best movies or TV shows after a day of work or a Sunday at home. It is the central aspect that has contributed to the change of Netflix from DVD service to the biggest streaming portal on the planet.

The micro-activity of a user needs to be aggregated by the portal to create output (Figure 2). In the case of social media, the data accumulated is sold to advertisers or marketing companies for external purposes. Netflix keeps its data for internal purposes of recommendations and improvements of the platform. It is in the best interest of the company to hide the valuable data from competitors in order to create the most personalized content in the market.

After encoding of the actions, the successive step is the aggregation of those actions in to clusters of data that will be categorized and will form the informational output of the portal, to be fed as recommendation back to the user shaping its future behavior. Netflix uses the aggregated data for every aspects concerning its organization. It concerns the look of the interface, the images, the licensing rights for shows the company will buy, the movie they will finance. Unlike social media platforms, Netflix stores this data mainly in-house and the recommendation capabilities in its area of expertise reach for the stars when the data available is continuously expanding.

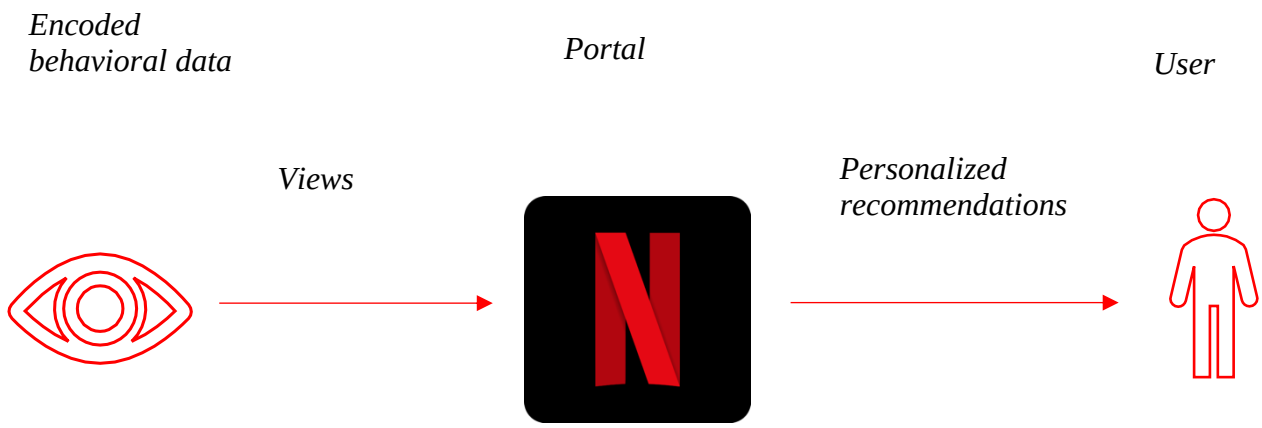


Figure 2.

TAGS

Data needs to be aggregated to create relevant output for Netflix. Data on individual users are not treated as distant islands but grouped into “clusters” of similar users that can be targeted by the same ads or recommended the same movies. Tagging is the action that links users to the object. At Netflix, they link the users to movies and TV shows. Tagging a user to a certain movie allows the company to associate that particular user with other users tagged to that item, grouping them together. So every user will be a concentration of tags that can be clustered together to form groups and networks. The activity of viewing a “A Marriage Story” by director Noah Baumbach will tag the movie to my user activity forever. The film is the data-object for the Netflix algorithm, while our viewing will tag it to our history.

Netflix’s algorithm has been refined by the ever-increasing amounts of data it receives, but initially revolved around the idea of “customer clusters”. In the times of DVDs, Netflix presented a movie to customers that belonged to the same cluster but had not seen that movie yet (Keating, 2012). This idea of clusters goes in the opposite direction of that of “mass customization” of the present day. The idea of clusters is still widely used in the company to

group users with the same tastes, or tags. Today's strategy is more refined because this *modus operandi* referred to the pre-streaming era, while for many years the company has been able to target more precisely the single user. Nevertheless, *collaborative filtering* is a strategy still used by Netflix in the recommendation movies based on the behavior of similarly tagged users. Through this feature, the algorithm gathers data on our activity. The distance between various objects, like movies, is given by the rating of the individual of the same item (Alaimo and Kallinikos, 2019). If the users watch the same movie until the end and they give it a "like" they will probably end up in the same cluster and *will be recommended similar movies*.

TAGS and Netflix

The link between the users and the content in the platform is done tagging the movies with specific tags. In the case of Netflix these tags are *genres.* Normally, movie genres have been only a few even though the concept of delimiting a work of art with a single word might be very dull. If one had to categorize all the comedies of this world together, there would be no chance for personalization which is the innovation that Netflix has brought to entertainment. Before the launch of Netflix Originals, with the company entering the world of production, the tagging system was mostly done by computers. Users rated the content, giving stars from 1 to 5, and the system generated recommendations. In 2006 Todd Yellin, VP of product innovation at Netflix, started manually creating tags for movies (Fritz, 2012).
A brief description of tagging is shown in Figure 3. If I have watched "Twin Peaks" then I will be suggested shows like "X-Files" or "Criminal Minds" because all of them have been tagged as "cerebral", "suspenseful" and "tv mysteries" .

Figure 3.

Tagging serves as the basis of online recommendations and Netflix's case is no different. To pinpoint even more precisely the tastes of its users Netflix engaged in an activity called "micro-tagging". The project, initially called "Netflix Quantum Theory, decomposed every title into several smaller parts that defined various aspects of it.

> The Netflix Quantum Theory doc spelled out ways of tagging movie endings, the "social acceptability" of lead characters, and dozens of other facets of a movie. Many values are "scalar," that is to say, they go from 1 to 5. So, every movie gets a romance rating, not just the ones labeled "romantic" in the personalized genres. Every movie's ending is rated from happy to sad, passing through ambiguous. Every plot is tagged. Lead characters' jobs are tagged. Movie locations are tagged. Everything. Everyone. (Madrigal, 2014)

Netflix created hundreds of "*alt-genres*" that are used by to target films, creating personalized genres aimed at the most diverse audiences. The decomposed movies are fed

into the algorithm that creates numerous alternative genres suited for every user's taste. That's the peculiar combination of human and machine power, achieved by curating the platform content and developing the best recommendations. At first the company encouraged its users to rate movies, so they could create a predictive taste profile of the different viewers. The Rating System used in the first years was useful for the DVD business but the passage into the realm of streaming allowed the company to develop more subtle and appealing ways of recommending entertainment. Netflix decided to create a more effective system that would make the 5 star ratings look obsolete. The idea was to rank the movies in the portal using a new system that would mix ratings and popularity (Amatriain et al., 2012). The goal of Netflix is ultra-personalization, creating the perfect home page for every user. Only using the predictive rating in the algorithm might have led to extreme personalization, showing too niche content. On the other side, popularity is a good predictor taste but is the exact contrary of customization. Netflix's engineers combined these two feature to create the best ranking, balancing taste and popularity. That's when the need for alt-genres was born. They needed some very personalized tag that would appeal to different audiences in different ways.
The alt-genres made the recommendations more palatable for a human audience.

Structure of the homepage and A/B testing

The algorithm and human creativity work together at Netflix to ensure the best experience for the user while browsing through the portal. The content, that is accessible via the portal, is selected according to various factors. On Netflix, the search for content accounts for only the 20% of the total content viewed (Gomez-Uribe et al., 2015). 80% is recommendations. The way the content is presented to the user and how the user browses through it impacts dramatically the outcome of the process, the total hours of content watched in the portal. The great choice of videos that characterizes streaming portals needs to be organized to provide the best navigation adventure to the subscribers. For this purpose, Netflix's homepage is structured in small videos, each one representing a tv show or a movie. The videos are organized in *rows* and every row has a different title in order for the user to understand it will contain homogeneous content. The rows are created following a specific process that involves :

1) Finding videos that are likely to be relevant to the user.
2) Generating evidence to support the creation of the row.
3) Filtering each row, eliminating previously watched movies.
4) Ranking the videos so the most appropriate are at the front of the row.
5) Applying a row-selection algorithm to create the full page.
6) Formatting the full page to the specific device like TVs, iPads or iPhones.

As we have seen, Netflix's approach is aimed at balancing diversity and popularity. The personalization approach

> largely focuses on helping our members find something new to watch, which we call discovery. However, we also want to make it easy for a member to watch the next episode of a show or re-watch something that they watched in the past, which normally falls outside the realm of recommendation. We want our recommendations to be accurate in that they are relevant to the tastes of our members, but they also need to be diverse so that we can address the spectrum of a member's interests versus only focusing on one (Alvino et al. 2015).

Every aspect of the homepage of Netflix is decided by the algorithm, whose decisions are tailored on our behavior. The first approach used by Netflix was static. There were the three main rows placed on top of the homepage : 1) Continue Watching 2) Top Picks 3) Popular on Netflix. Then followed rows containing alt-genres , personalized according to the users' tastes. With time every aspect of the homepage was selected by algorithms, leaving heuristics aside. The placement of rows and the title in the row itself are continuously improved and personalized by machine learning. The constant structure of the homepage remained the same, even though the algorithms behind it changed and improved their capabilities. The rows have been omnipresent in the homepage, being a very effective way of presenting videos and collecting data. The recommender ranks rows within each other, with the best on top, and across them, with the strongest row on top (Figure 4). The navigation is more likely to be made in a vertical direction rather than horizontal, because of this the stronger rows will be placed on top with the strongest titles always at the beginning of the row.
The advantages of choosing rows help both the user and the company. For the user, it is more intuitive if the videos are organized per a common theme. He can decide whether to explore the row/altgenre or keep scrolling. For Netflix, "*it is easier to collect feedback as a right-*

scroll on a row would indicate interest whilst a scroll-down (ignoring the row) would indicate non-interest (not necessarily irrelevance) (Chong, 2020).

Figure 4. Source: Alvino et al., 2015.

A/B Testing

As the algorithm creates better versions of the interface, the effectiveness of it is tested on the users themselves. My experience with the portal was of a flow constantly changing. As we have seen, Netflix defies all the rules set by previous forms of entertainment. The library is always changing, as new content licenses are bought by Netflix to be streamed and old licenses expire. The search for new content is always commanded by the new patterns of taste that the data suggest. Not only the content is changing, but also the way it is presented to the subscribers. The fast-paced streaming environment is characterized by this transforming feature, a hybrid that is constantly adapting to the new nuances in humans' culture and tastes.

One of the ways Netflix improves its product and its interfaces is **A/B testing**. A/B testing is used for comparing two versions of a website and finding the best version. A and B are two variants of a page and the page that works better is found with statistical data. "*Running an A/B test that directly compares a variation against a current experience lets you ask focused*

questions about changes to your website or app, and then collect data about the impact of that change" (Optimizely, 2020).

As research conducted by Variety in 2016 found out that A/B testing increased 20%/30% video viewing after the company introduced changes in its interface.

At Netflix the testing is conducted by creating an experiment. The experiment is made by creating a control group and one or more experimental groups (Netflix, 2016). Each group is called "cell" in the Netflix engineering jargon. Every member will be part of one cell only. One of the cells will be the "*default cell*", or the control group. These users will have the same experience of the usual Netflix interface. The experiment cell is named "*test cell*" and will show possible improvements in the product. Once the test begins, some metrics are tracked to calculate the efficacy of the test. Usually they are *streaming hours* and *retention of subscribers.* Once enough data is gathered, the new interface is presented to every subscriber. A/B testing allows the company to change its shape according to the country where it is accessed or the user it is accessed by. A/B testing was a groundbreaking experiment because allowed the portal to present its best version to every user.

The possibility of running experiments on the users is very useful for Netflix because it allows to present the best product available. The company's revenues are completely based on the paid subscribers, so the maximization of the product satisfaction is central at Netflix. The recommendation system via A/B tests is the tool that Netflix uses to maximize the revenues. Better recommendation will lead to higher customers satisfactions, thus to higher revenues. They are:

> […] proportional to the number of members, and three processes directly affect this number: the acquisition rate of new members, member cancellation rates, and the rate at which former members rejoin. […] When a test cell is a clear improvement over the current experience, we see members engaging more with the part of the product that was changed (a local engagement metrics win), more with the Netflix product overall (an overall engagement win), and higher retention rates (a clear overall win) (Gomez-Uribe et al., 2015, p.9).

The example of artworks is emblematic because shows how A/B testing has led the way to personalization in yet another of the infinite fields of machine learning applied to entertainment.

An example of A/B Testing : Artwork selection

The interface is the most important part of the experience for a Netflix subscriber. We have seen how the organization of rows and their content is adapting to the user's behavior. Netflix conducted several studies and found out that artwork was the biggest influencer in a viewer's choice (Nelson, 2016). Over 82% of the user's focus was on the artwork when browsing through the homepage. As a reader, I am incredibly influenced when I pick up a book and it has an extremely captivating cover. The same reasoning is valid for Netflix's titles. The difference is that Netflix can collect data on the cover of its content and find the best artwork for every title, so that the artworks will constantly change.

The artworks were originally sent to Netflix by its partners, before the days of the Netflix Originals. Even after "House of Cards" and "Orange is the New Black" were born Netflix continued to stick with a single artwork symbolizing TV shows or movies. Sometimes the images were sent from the studios and had to be adapted to the small format that is shown in the Netflix interface. Many images were taken from billboard and DVD covers. They served different purposes and they did not adapt well to the library-like interface. Then, Netflix started experimenting different images through A/B testing and had great results.

Netflix used its usual approach for introducing new products. It gathered as much data possible and then made the best decisions. The engineers ran three main experiments, (Krishan, 2016) with increasing levels of accuracy. An interesting example was experiment number 2 of this series. It was conducted on great number of titles from the Netflix library and was meant to prove an increase in aggregate streaming hours by selecting the most appropriate artwork.

The experiment was a two part *explore-exploit test* . The first part consisted of showing to different "cells" various artworks. Cell 1 was the default cell or control group. The other cells were administered different images to find the most engaging for every cell. Different artwork variants were served according to several metrics. The second part was based on administering the winning images (one for every metric) to several cells and calculating the aggregated streaming hours. The results were striking and showed a significant increase in engagement in the case of the best artworks.

There were some commonalities between the images that had the most success. The first evidence in a previously unknown area.

1) Emotions were fundamental. Many winning images had characters that showed strong emotions, outperforming more mild expressions.
2) Regional differences matter. One of the first discoveries was that A/B testing conducted in different countries had different results. This was the first step towards an even more detailed personalization that will select artworks according to one's previous behavior.
3) Villain outperformed more good-willed characters
4) Showing the ensemble cast causes lower engagement. The small format that is used by Netflix favors images that portrays just a few, or even better one, of the characters of a show or a movie.

The A/B Testing shed light on an undiscovered area in the realm of entertainment. We have seen how important was for Netflix to increase the effectiveness of these images that led directly to an increase of streaming hours. This is not hard to imagine as the artworks are obviously the central aspect of the interface, the way the user interacts with his favorite content. Since 2016, at Netflix is in place a continuous experimentation. The users see the portal constantly changing under his eyes, until he finds the most suitable version for his preferences. Like in the example shown above, the experiments ran on the portal bore fruits. Netflix managed to explain not only why some users chose certain artworks but also why they chose it. The more experiments are run, the better improvements for the system.

Artwork Personalization

Netflix managed to find the best artworks for the biggest fraction of its users. For the Los Gatos company this was barely enough. The goal of the portal is always the personalization of the offer and the case of the artworks made no difference. The final goal was finding the best image for the individual user.

The engineers at Netflix started improving the simple A/B testing rolled out at the beginning, with more contextual analyses of the user's tastes (Chandrashekar et al, 2017). They wanted to find the most suitable artwork according to the user's past behavior. Netflix developed a more effective A/B testing model to predict a user's profile and find the perfect image for his tastes. The easy example that explains the work that happened at Netflix is the following: if a

user has watched many Uma Thurman's movies then the Pulp Fiction recommendation will include her artwork, whether if he has watched John Travolta's movies the artwork will include his character. The personalization went more in depth than the example provided because the goal was to create a more general profile type of a certain member to provide the right images (Figure 5).

Profile Type	Score Image A	Score Image B
Comedy	5.7	6.3
Romance	7.2	6.5

Image A

Image B

Figure 5. Source: Chandrashekar et al., 2017.

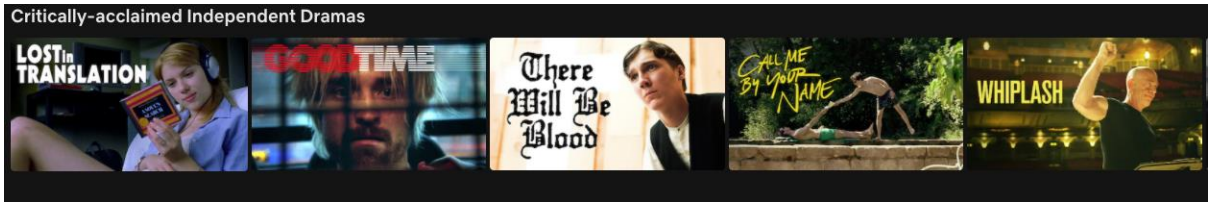
The outcome of the new testing was Figure 5. The contextual analyses provided a profile type, a comedy-inclined and a romance-inclined. Then the portal would present Image A to the Romance profile and the Image B to the Comedy profile. This example of contextual personalization is another of a long list of personalizing skills shown by the portal. The artwork, alt-genres and rows are the tools used by Netflix to increase its potential. The more the portal is personalized, the more streaming hours a user will generate and the higher the retention rate of the subscribers. New algorithms are constantly tested on the users to find those that provide the portal with the best outcomes.

3.1 Netflix Algorithms

We have seen a few of the recommendation techniques used at Netflix to increase their favorite metrics. The rows are a fundamental feature of the homepage, defining the very skeleton of the portal. The rows are organized mainly according to alt-genres, the innovation born at Netflix headquarters that mixed human creativity and machine learning. Now I want to describe the main algorithms used by the portal to present the content to its users. These algorithms represent the core of Netflix's structure, the backbone of the company's business.

Personalized Video Ranker (PVR)

The PVR is a general purpose algorithm responsible for the generation of the personalized alt-genres. The catalog is filtered using some criteria to group shows and movies with similar characteristics, the alt-genres. The content is organized in rows, as we have seen, and rows of the same genres often present different videos to different members because of a good dose of personalization. In order not to become too personalized Netflix will also show us "popular" titles, often if not always Netflix Originals.



Top-N Video Ranker

This algorithm is similar to PVR with the difference that generates only one row of the homepage, the "Top Picks". Both algorithms mix personalization and "popularity" but the *Top N* works only on the best items of the catalog while *PVR* has to analyze the whole library. This row has changed its name throughout the years to "Popular on Netflix" but the algorithm behind it kept being the same.
In 2020 Netflix introduced a "Top 10" list, that slowly substituted the *Top-N*. The *Top 10* calculates the 10 most viewed shows or movies on the portal. According to Variety (Spangler, 2020) the *Top 10* will be created according to a new viewership metric established

at Netflix. The *Top 10* will track the content that will gather most streams by accounts going above the threshold of 2 minutes in the previous 24 hours. The various lists will differ according to the country, in order to show a diverse and localized ranking.

Trending Now

Netflix has found that a strong predictor of viewing behavior are short-term temporal trends. The *Trending Now* ranker creates a row that contains the shows or movies that are being watched in a certain time span mixing them with some personalization. An example could be a surge in popularity of Christmas movies during the holidays. An emblematic case is the recent pandemic caused by the Covid-19. During quarantine Netflix's Trending Now row was predictably full of movies about pandemics and zombies.

Continue Watching

Netflix started its production journey with TV shows and they still are a big focus of the company. Series make up for most of the streamed content on the portal and *Continue Watching* ranker is fundamental to let users resume watching shows half-finished. The same is true for movies. Netflix produced The Irishman, the latest Martin Scorsese flick. It was reported (Alexander, 2019) that only 20% of the American viewers watched the movie in one sitting, while the majority divided it into at least two parts. That's where this ranker comes in handy.

Video-Video Similarity

This algorithm is technically non-personalized because it shows the content similar to some item consumed by the user. The videos are chosen from a ranked list of similar items to that specific show or movie. In this sense the items are chosen according to a similarity algorithm and thus are non-personalized.

Business Value

Netflix needs to increase the number of subscribers on a regular basis, keeping its users happy. The business of streaming portals lies its foundations on subscriptions. The two pillars that provide this achievement are:

1) *Streaming hours*
2) *Retention rates*

The recommender system is aimed at keeping users glued to their screens to drive up this two fundamental metrics. Fundamentally, every algorithm shown and every peculiar aspect of the Netflix experience have these two goals. Personalization is the path that leads to increase in revenues and the way is to “Keep Watching”. The business value of the portal is calculated using two more metrics: the *effective catalog size* (ECS) and the *take-rate*. The recommender system is used for increasing the effective catalog size. This metric defines how heterogeneous is the streaming on the portal. If all the videos have the same amount of streams than the *size* will equal the total number of videos. This metric explains why Netflix is interested in producing niche content, challenging the old ideas of network television and

following the path started by cable companies. The recommender spreads streams along the whole content, suggesting the most tailored content and increasing the ECS. This metric is important for a broad perspective, because it increases the variety of the offer at Netflix. Increasing the ECS will push Netflix by producing more original content that will intrigue the most refined palate. The metric that needs to be combined with the ECS is the *take-rate*. It reflects the relationship between recommendations and plays of a certain video. Once the PVR algorithm is applied, the take-rate shoots up because videos are played dramatically more. These two metric are responsible for calculating the impact of personalization on Netflix's system, increasing the overall plays and lowering cancellation rates while keeping the revenues up.

Algorithms and A/B testing are the backbone of the company, sustaining the growth of the streaming giant against its competitors that have a weaker technological firepower. This technological skeleton has influenced the production of content that has come out the company since its Original shows. In the next chapter I will try to delineate the impact that the technological infrastructure has had on the culture and the content, trying to understand where technology and entertainment are fused together and where are headed in the future.

Chapter 4 – Synthesis of data and media

Netflix has changed the way we view entertainment. The switch from regular television to streaming-only entertainment will be slow but gradual in the following years. I have analyzed some innovative features that have transformed Netflix into an hybrid beast, at the forefront of both technology and television.
Entertainment has always been influenced by the developments of technology and contemporary developments make no exception. Data has changed the business, as the change from mass-media to mass-customization started being the norm. This radical shift created a huge innovation in the culture generated and influenced by Netflix. Netflix has changed the way television and movies are made, by following the trail started by companies like Facebook and Google. In this chapter I'll analyze the application of the data to the actual creation of original content in the portal that will highlight the innovation an organization like Netflix has brought to the entertainment world. Then I'll try to delve into some possible future scenarios for the company.

House of Cards

The show that made me fall in love with Netflix was with no doubts "House of Cards". In 2013, the show was ground-breaking. It was created following the same path of subscriber-funded networks, like HBO. The show was made by mixing great acting, high-quality screenwriting and well-known directors. This is the show that changed the story for worldwide culture, because brought Netflix into the lives of many people. Even if Netflix was not in Italy yet, the incredible quality of that show made me look forward to the Italian launch of Netflix, eventually happening in October 2015.
The central importance of this show is not only in its artistic value but also in the hidden motives that caused its development. In fact, House of Cards was one of the first shows ever to be heavily influenced by the data collected by Netflix over the years. The various recommendation algorithms we have seen not only influence the content you are shown on the portal, but also the content that is being produced by the company. That's when data

becomes a carrier of value in our society, a shaper of pop-culture. House of Cards was the first of this type of content, a pioneer in data-based shows.

In 2011 Netflix bought the rights for a remake of the television series “House of Cards” broadcasted by the BBC in 1990, a political thriller set in the post-Thatcher United Kingdom. The new House of Cards, set in the United States, cost from four to six million dollars per episode, for a total of more than 100 million dollars for the whole first series (Bulygo, 2018). Netflix made a huge investment in this show, sure of its hit potential. The growth of the company was steady, having switched from the DVD-based business to online streaming since 2007. The year that changed the course of Netflix and, consequentially, the course of entertainment was 2013 and the main cause was House of Cards.

The data assembled throughout the years showed synergies between a set of content. In fact (Bulygo, 2018) :

- Many users watched the David Fincher movie “The Social Network”, that came out in 2010.
- The aforementioned British version of House of Cards was a big success.
- The people that watched the original House of Cards were also watching movies by David Fincher or content where starred Kevin Spacey. Not to mention the giant thriller hit Se7en (1995), directed by Fincher and starring Spacey.

Figure 1. Source: loginworks.com

The company had a lot of data to infer the probable success of a show based on the original House of Cards, directed by David Fincher and starring Kevin Spacey.

The ability of following trends and producing similar content was not big news in 2013. In American television there has always been a tendency to follow trends and produce the most watchable content by several groups of the population. For example, the huge flood of teen-drama that inundated the world after the success of Beverly Hills 90210. Producers had tv-ratings they could trust in order to create content that could please the public. The new approach introduced by Netflix, though, is of extreme precision. If the company knows when you pause a video, when you keep watching or when you stop the streaming altogether, it will be able to create better predictions of what you might like. If they know exactly what movies and actors and genres I am interested in, they could create the perfect content that would please the tastes of myself , at least the data-rendered version of myself.

Entertainment before Netflix was like advertising before Google. I am sure advertising that broadcasted after lunchtime, when I went to elementary school, had a high percentage of success. The chances that a random kid has of being exposed to some interesting new toy shown on television are very high because advertisers knew that kids after school will watch television, right before starting their homework. Now advertisers have dramatically increased the chances of attracting the attention of kid, because they know what he searched on his smartphone or iPad and they will provide him with the appropriate ad after his favorite YouTube video.

Netflix applies the same concept to the world of scripted entertainment. When networks and traditional television were the norm, broadcasters knew what time of the day was the most suitable to show teen-dramas, cartoons or erotic movies. They did not know for sure, but kids were most likely to watch content during the day and early afternoon while adults would watch tv at night. Also, they knew what content would probably be good, hit or bad according to gut-feeling or previous history. This seems like a past long gone. Netflix knows everything (Figure 10). The contextual nature of the data allows them to know what type of content I would be likely to watch on a Tuesday night or on a Sunday afternoon. The data-gathering has thus become not only a mere aggregation of plays but a contextual analysis of the users' shifting taste.

The chances of producing content that will be enjoyed by many people have dramatically increased and will keep increasing as Netflix gathers more data. What I find most interesting of this increased ability of personalization is the chance to target so many different groups of

customers, which places the media-tech company in a completely different universe compared to old mass-media. Whenever they create some content for the old traditional Audience, that will consume the most mainstream content available, they will also propose something innovative that targets that mini-niche of art-house fans. This mass-customization applied to entertainment is the present and future of tv and movies, the Newsfeed of Facebook applied to your tastes in movies.

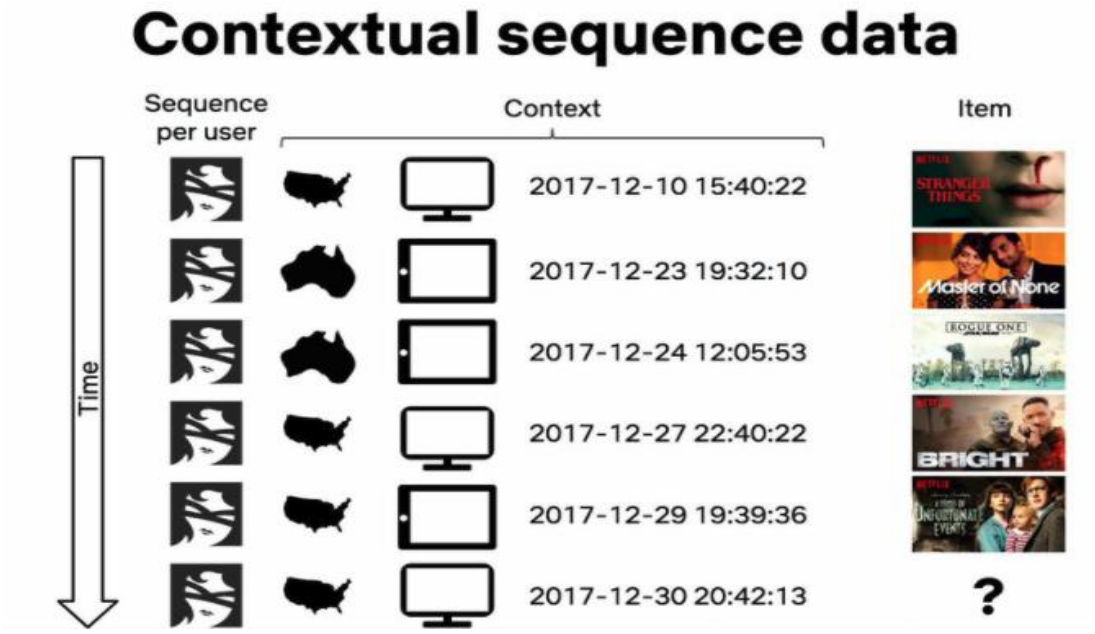


Figure 2. Source: Basilico, 2019.

Starters, completers, watchers

Netflix links technological hub and users via the glue of data. Data is the fuel that keeps the portal going and creates better predictions of our tastes. Data connects the different ecosystems and is the real core of these organizations. It's the added value of these companies, the "holy grail" of portals. Via the constant improvement of its interface, artworks and content Netflix has dramatically improved its capabilities in just a few years. Data has allowed Netflix to create better experiences and more personalized content, enhancing the experience of the user and its overall business value. Technology has caused

Netflix to make the transformation from platform to tech-portal via the massive focus on aggregation on data on the users' behavior.

Netflix has always been secretive regarding its data. While the ratings and viewers of classical television have always been scanned and public the day after shows, Netflix' viewers have been a mystery for the whole time. The portal uses different metrics to evaluate the success of a show which a very different than regular television. The datafication of the viewing experience has changed the ways in which the Audience's attention is valued. Netflix has been trying to open up its vault of data, with the aim of being more transparent towards its creators and its viewership. The most watched season to date, per company revelations, is the third season of **Stranger Things** with 64 millions viewers in the first month of its release (Alexander, 2019). Viewers are divided in three categories :

> Starters are "households that watch two minutes of a film or one episode" in a series. Completers are "households that watch 90 percent of a film or season of a series." These are the two main data points that Netflix gives to its producers and directors, according to the letter. This data accounts for the first seven days of a release, followed by the first 28. The third data set is watchers, a more general metric that Netflix often includes in its quarterly earnings letters to shareholders and shares with the public. Households that watch 70 percent of a movie or one episode in a series are considered "watchers." (Alexander, 2019)

This three main categories of users are fundamental to understand the Netflix strategy in the long term. This set of data needs to tell the company whether a show is worth renewing. It will be of high value for the content creators to know if their show would have gotten enough *completer* or *starters*. This categorization of viewers falls again under the discourse of encoding the actions made by the users to gather data and, in turn, to create better products. In particular, Netflix needs this data to calculate the ratio of cost of shows to viewership, preferring the shows that cost less and manage to retain a bigger number of subscribers. The ability of Netflix to target micro-niches is paralleled by the need of creating the shows that will keep the most subscribers. Netflix's business model is based on subscriptions and the shows have to keep users satisfied.

Methods for analyzing the viewership have always been around but Netflix, once again, has managed to have pure behavioral data on the action of its users. The show that has reached the peak of datafication of taste is Stranger Things.

Stranger Things

The other show that clearly embeds the path taken by Netflix is Stranger Things. The show, created by the Duffer Brothers in 2016, is a sci-fi where the main protagonists are kids living in the Indiana of the 1980s. The show became a huge success, gaining fans season after season, and it is Netflix's most formidable hit. It is the show that gave Netflix worldwide success and which protagonists have become the ambassadors for the Netflix brand. Stranger Things is a show that makes the *homage* one of its central features. Many aspects of the show are more or less obvious homages to movies and habits of the 1980s. The kids biking all over their town like in Stand by Me or playing Dungeons and Dragons in classic 80s fashion. If one is a bit of film *aficionado,* he will get most of the references to Steven Spielberg or John Carpenter, if one is not (younger audience) will be amazed by the sci-fi/horror atmosphere and the pre-teen gang, fighting against evil American style.

Stranger Things is the perfect example of the "mathematization of taste" (Alexander, 2016) that has been brought by Netflix to the entertainment industry. The rise of algorithms and recommendations has turned content into a direct outcome of the categorization of taste of Netflix's users. As Dan Hassler-Forest summarizes :

> as much as I did enjoy it, there was also something uncanny…that I found even more unsettling than the [show's monstrous] 'Demogorgon'…It was the sense that there was something mechanical, something pre-programmed, even something truly inevitable about my first response to the show: almost literally as if it had been tailor-made just for me. (Hassler-Forest, 2016)

Stranger Things has brought to perfection what already started with House of Cards in 2013. The datafication of taste has created an even bigger hit, a product that has unified the taste of many categories of users perfectly tailored for them. Users are not seen individually but as categories, measurable types used for managing a large population and creating products that will certainly be successful. In the case of Stranger Things, these are horror/Spielberg/sci-fi/1980s. Such categories before the launch of Stranger Things were indeed very relevant for Netflix. They created a show that could mix these categories in a very powerful manner and capture as many users as possible. According to Alexander (2016) the three main methods used by Netflix in the mathematization of taste are :

- User's personal profiles. His searches, his *likes*, his past viewing history.
- The collaborative filtering, via *Customer Clusters* mentioned above.
- The tagging system analyzed above, meant to group together similar films made by the same director, with the same actor or created in the same year.

The categorization of movies, genres and users allows the perfection of the recommender system. In fact streaming organizations " […]*orchestrate the participation of highly dispersed and atomized populations of users which they seek to maintain and enlarge. […] The steady production of recommendations renders the atomized user platform populations as a sort of surrogate community, whereby users are made similar to one another on the basis of a computed similarity"*(Alaimo & Kallinikos, 2020, pp.15-16).
These combo of techniques has allowed Netflix to create the perfect *stream-machine* that is Stranger Things. Netflix, honing its machine over the years, has created the perfect recommendation system. The equivalent of the post you'll definitely like, the ad will you definitely click on.
Whether or not one sees the new categorization of taste as a monster from another dimension, one cannot avoid but acknowledge the actual state of our culture and technology. In the previous chapter we have seen the techniques Netflix uses to gather data and provide an increased experience to its users. *The technological skeleton of the company has incredibly influenced the evolution of the entertainment world, where the creation of a new show on "television" is almost entirely influenced by sets of data and categories of users*.

The implication of this reality are vast and just starting to influence various aspects of our culture. The world of entertainment has always been central in the lives of people after the Second World War and regarding the changes of this world as marginal could be a foolish mistake. Recommender systems in place in streaming organizations continue to increase a division in our society that could have had many consequences on our society. As mentioned in Chapter 1, television started as mass-media while capitalist society was just beginning after the destruction of the wars. Media was a unifier of cultures, an aggregator of taste that shaped and was shaped by daily changes of a society. Over the course of the 20th century this role of media started vanishing thanks to the developments of various kinds of technologies that allowed the creation of more nuanced shows, with the media adapting to please various segments of society. Netflix and streaming organizations represent the last version of this

continuing evolution of media and technology. Internet television powered by algorithms, recommenders and big chunks of data has gone the extra mile to create a hyper individualized version of entertainment. With these conclusions, in the next paragraph I'll delineate a possible evolution for the entertainment world, a complete individualized experience that could merge the user with the narratives of entertainment.

Bandersnatch

Netflix is a data company, before being a media company. Data has always been central and has fueled every content produced and created as Original, as we have seen in the cases of House Of Cards and Stranger Things. Like social media platforms, Netflix has encoded user's behavior to use aggregate data to personalize tastes, interfaces and pictures. The data has been fed back to users in order to improve their experience on the portal. The recommendation algorithms have improved with the increase of data accuracy given by the mounting number of new users to the portal.
At the end of 2018, Netflix released a new episode of the popular tv show *Black Mirror* by creator Charlie Brooker. The particular aspect of this new episode was its interactivity. *Bandersnatch* is, in fact, an interactive film that allows the viewer to choose the path taken by the protagonist over the course of the film. Much like a videogame, the viewer has great control in choosing the narrative of the story.
Netflix had been experimenting with interactive shows since 2017 (Newton, 2017) but Bandersnatch has been the first success of this type of format. The structure is refreshing and it is an interesting take in the combination of different media like movies and videogames. We have seen how the focus of Netflix has always been primarily on data and *then* on production of content. The recommendations allowed the company to increase its robust takeover of the global market, personalizing genres and artworks to increase user engagement. Interactive movies can create a new frontier in the data gathering activities revolving around cultural industries. Interaction is the mirror of a person's own tastes, the ultimate live rendition of its behavioral data. In fact :

> Bandersnatch can generate more robust pattern discovery and insights into trend analysis than traditional content can. Where the company previously focused its data gathering on the ways users engaged with its content — what they watched, when, and for how long — this new

> data is indicative of real-world decisions like product preference, musical taste, and engagement with human behavior (Damiani, 2019).

Interactivity can lead the way to increase the depth of the data collected by Netflix, that can go beyond the behavioral data generated so far.
The ways in which users handle decisions can be matrixed with the choices they make in resulting timelines. Those choices offer unprecedented insight about what Netflix's subscribers want out of a story and what choices they most want to see characters take. The first consequence could be on the shows themselves. The new insights could greatly influence the way shows are presented to the specific user. In the future, Netflix could present scenarios with a greater number of choices, each tailor-made for data harvesting. Like in the parallel branching of the story in Bandersnatch, Netflix could position certain story beats before others, depending on who's watching and what their past choices have said about what they want out of a story. We have seen how the creation of certain shows was influenced by the behavioral data. In the future, even the storyline of those shows could change according to the past choices the viewers made.

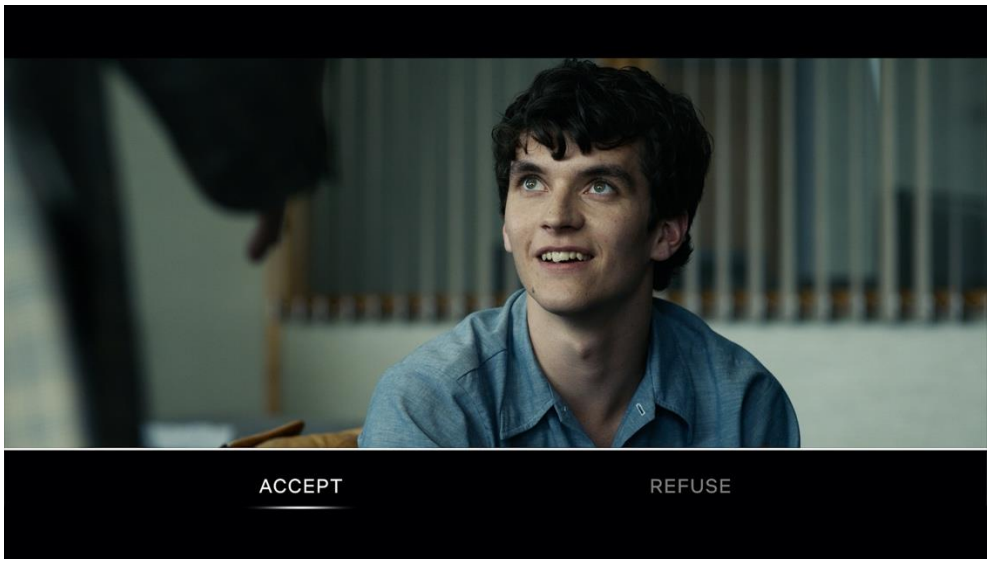


Figure 3. Source: Netflix.

The data gathered by Netflix will not only affect future screenplays and stories but could be stored and used in tandem with other companies, through deals and partnerships.
We know for sure that Netflix keeps track (Figure 4) of all the choices made by users while playing the game because of the investigation by made Michael Veale, professor at the University College London. Veale requested the data Netflix gathered after he interacted with

the movie and the company complied with the GDPR regulation (Gault, 2019). This comes as no surprise because of Netflix's focus has always been on data, but sheds more light on the strategy regarding the Bandersnatch affair.

The following Choice Key table contains the key to the "choice_code":

Code	Choice
1D	FROSTIES
1E	SUGAR PUFFS
1G	NOW 2
1GA	WORK AT TUCKERSOFT?
1GB	WORK AT TUCKERSOFT?
1H	THOMPSON TWINS
1HA	WORK AT TUCKERSOFT?
1HB	WORK AT TUCKERSOFT?
1PA	GO BACK
1QA	REFUSE

input_type	choice_code	has watched choice	source	utc_date	utc_hour
userinput	1E	FALSE	www	20181229	20
userinput	1H	FALSE	www	20181229	20
userinput	8A	FALSE	www	20181229	20
userinput	1Qtt	FALSE	www	20181229	20
userinput	2GA	FALSE	www	20181229	20
userinput	1R	FALSE	www	20181229	20
userinput	No	FALSE	www	20181229	20
userinput	3B	FALSE	www	20181229	20
userinput	3Ax	FALSE	www	20181229	20
userinput	3C	FALSE	www	20181229	20
userinput	3R	FALSE	www	20181229	20
userinput	3T	FALSE	www	20181229	20

Figure 4. Source: Veale (2019).

The interactive content would allow the company to get direct insights into the product choices of its viewers. In fact, the interactivity of shows like Bandersnatch would create a direct connection between the consumers and the marketers, via Netflix data-harvesting. The first decision the viewer has to take is between two brands of cereals: Frosted Flakes and Sugar Puffs . This decision could be deemed as unimportant by the viewers but its simplicity could reveal a deeper meaning for Netflix's strategy. This type of choices could be used by Netflix to gather data that goes beyond the preferences of movies, tv shows or artworks. It

could lead the company into the market. Gathering data about brands would create a surplus that the company *could* sell to interested third parties.

These type of content represents an opportunity for Netflix to market to its users while learning from them. By harvesting the data linked to interactive movies, Netflix will be able to link specific products with certain demographics. On the other side, the company could directly test product designs (e.g., two different Frosted Flakes box covers). This is a service that Netflix could sell even before the creation of a show or movie.

Though Netflix has often advocated secrecy about its viewership data (except when they had a clear benefit) the future could be different . If Netflix enhances its understanding of its users through the rendering of data via interactive shows and movies, it could sell them to third parties or create deals with external companies. The company could continue hiding the data while proposing deals to third parties behind the curtains.

Another action in the movie regards the choice of a cassette Stefan will listen to. The choice has no impact on the plot, but it impacts the soundtrack that will be played in that scene. In this fascinating choice the viewers are asked an aesthetic question, specifically their preference of a product over another similarly to the cereal's dilemma.

In this dialogical form, the viewers are asked about their tastes in daily products and in music. Their choices are stored by Netflix forever and they could lead to partnerships with companies for a space in the interactive movie.

Interactive movies can create an environment in which the viewer is called to take decisions in real life situations. This provides companies like Netflix, a type of data that is very accurate regarding the preferences of a specific user. The development of many interactive movies won't be an endeavor entirely conducted for data-harvesting purposes. Netflix is trying to create products that are cross medial, combining the fascination for multiple storylines of videogames and well written stories of films. This being said, the possibility of data rendition are many and avoiding this aspect would be very naïve.

The interactivity of new types of movies or shows could incorporate the decisions of the individual made in the previous experiences. One show could appear differently to every individual who is watching according to his previous choices, much like the Netflix interface and artworks are different for any of us.

Conclusion and thoughts

Organizations and technology in the past few years have become increasingly intertwined, arriving to the point that there is no organization without data. Data has become a carrier of value that shapes the very creation of companies and it influence the path this companies decide to take. The media world and media companies are no exception.
I have analyzed Netflix because it is the pioneer in this world where data and media are so deeply enmeshed. Netflix is at the forefront of technology and media combination. The same foundations of the company where built on data, behind a surface of movies and tv shows. The algorithms at Netflix shape the user's experience in ways never seen before. The interface and the way is presented changes for every person affecting the fruition of our favorite shows and movies. Like for social media, Netflix presents us an incredibly personalized version of the portal. A version that answer to our needs, tailored to our preference and previous actions.
The recommender system is an important tool of this media/data hybrid that has replaced national television and the traditional networks. The recommender is the ultimate tool that shapes contemporary society. Some see it as a facilitator while others think is more like a cage that does not allow us to see the world differently. In the case of Netflix, the algorithms create a version of the portal that suits our needs but in doing so it inevitably creates a mathematization of taste. Our cultural products are coldly filtered by the recommender which indeed feeds back our favorite products based on our previous history, without allowing for much diversity. The case of Netflix serves as a blueprint for the analysis of recommenders in the streaming world. The algorithms in place at Netflix are the best of their kind because of the amount of data they use. The more data and users will use the portal and the more accurate the recommender will become. The power that Netflix has gathered into its hands via data-collection has changed the nature of what at first was a platform, into a portal that uses data as its main carrier of value. The content created by the company will be a goldmine for data-harvesting practices that will keep reinforcing the portal (Figure 5). The processes we have seen in Chapter 3 have fueled the process of isolation between Netflix and the other branches of the entertainment system. With its big data apparatus, Netflix has been able to create shows and become self-sustainable while concentrating power in its hands and becoming one of the major players in the game. *The accumulation of data will gradually separate Netflix from the entertainment eco-system. The future of streaming giants could be*

those of isolated portals, several monoliths with exclusive content and exclusives chunks of hidden data.

The nature of the company, a media and data hybrid, has influenced the creation of shows that were based on the data gathered by Netflix. Technology has not only affected the structure of the portal and its interface but the cultural products that have come out of its forge. Shows and movies whose existence is based on the data gathered by Netflix have come to dominate the streaming world in terms of views and popularity. In the case of Netflix, the algorithm does not only affect the way in which content and information is presented to us, like in social media or YouTube. At Netflix, the data creates media impacting directly the universe of meaning in our culture. That's why I think Netflix must be placed in a different category because of its inextricable link between this two natures, where one does not exist without the other.

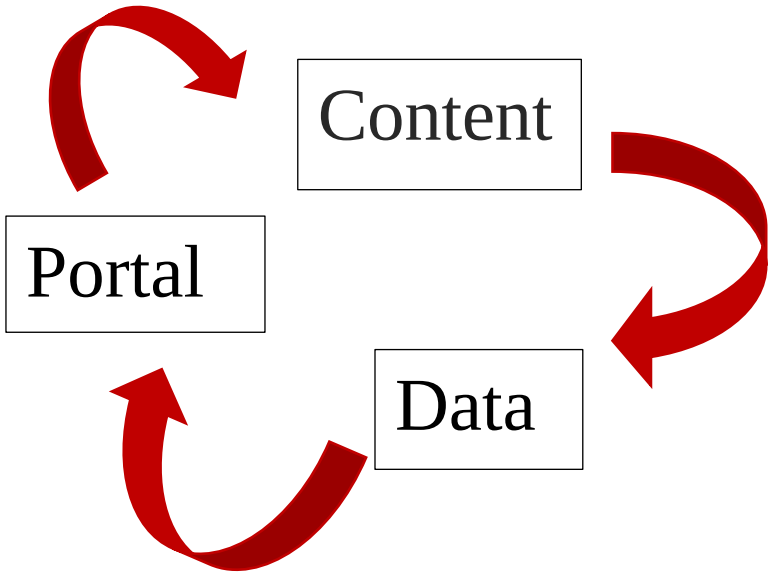


Figure 5.

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