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Next Player Video Service

The Case For Bringing Playlists to TV

A Technical Paper prepared for SCTE•ISBE by

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Table of Contents

List of Figures

List of Tables

Introduction

Live TV was, and still is, a brilliant discovery tool, but it needs a makeover. Sooner rather than later.

Live TV scheduling is all about audience flow. The ability to engage the viewer and retain them within that live broadcast channel is the primary function of good broadcast scheduling and how live TV has been able to maintain its dominance over viewing minutes for so many years.

When pay-tv was young, the linear channel was the only way of finding new content, with its limited possibilities it still served as a great tool in guiding viewers to content and providing a quick way of sampling a large amount diverse content. The TV channel logo and brand helped guide to the direction of channels and provided comfort in what to expect behind a certain logo. You would expect to find nothing but boats behind the "Sailing Channel" logo, and inspirational mood programs behind the "Travel Channel" logo. A channel without a clear enough content profile would often become less and less relevant and lose viewership.

In an SVOD and non-linear world the brands of the broadcasters play a less important role in guiding between content and the brand properties of the logos have been given less relevant. Instead, we can see playlists, recommendations and series emerging as the guiding stars for this. In this paper we will show how a strong playlist capability ("Next Player"), that uses Machine Learning and A.I. to compare similarities in types of content, can provide a good proxy for that scheduling art form.

Whilst the possibility of watching any content asset at any given time represents a superior customer value to the defined time slots of the linear channels, it also represents an expectation of an increasingly active customer and places a lot more of the burden of discovery on the consumer. This is a burden many customers are neither capable, nor willing, to shoulder. The lack of guidance in the user experience is now creating a problem for consumers in navigating and finding new content. We intend to show that this burden can be eased through content similarity analytics for matching, combined with user-created profiles; shifting the audience flow story and related value creation opportunity towards the platform.

The effect of the discovery problem we describe has been an increased amount of the consumers' time being spent on the process of discovery instead of watching content - searching for content or becoming paralyzed by the many choices. This in turn creates the perception of a significantly smaller content catalog than most players actually have available. By introducing the Next Player concept, we aim to reduce customer frustration and increase satisfaction as well as re-invigorating the traditional TV business model by modernizing the Linear TV viewing experience and creating new advertising inventory.

Content

THE BIG PICTURE

With live linear broadcast TV in decline, an explosion of choice is emerging in direct to consumer video. At the same time there are new enabling advances in personalization and content metadata emerging. In the context of these trends, there exists an opportunity to re-invent the lean-back live TV experience so viewers can spend more time watching TV and less time searching and browsing.

Live Linear Broadcast TV Is In Decline

Over the last 5 years, from 2015 to 2019, viewing and engagement with traditional linear broadcast TV has been declining at an increasing rate. Customers are substituting linear TV viewing by viewing content outside of the platform. Integration of direct to consumer video applications is becoming relatively common place for TV platform operators and these integrations are cannibalizing traditional "tune-in" live linear TV viewing.

As shown in Figure 1, over an 8 years period the live linear TV consumption in the UK will have declined each year (almost 30% from 225 to 160 minutes per person per day), whilst overall video viewing will has increased 11% from 258 to 288 minutes per person per day. It's clear that new direct to consumer video consumption applications are gaining traction and this has given rise to an explosion of choice for viewers.

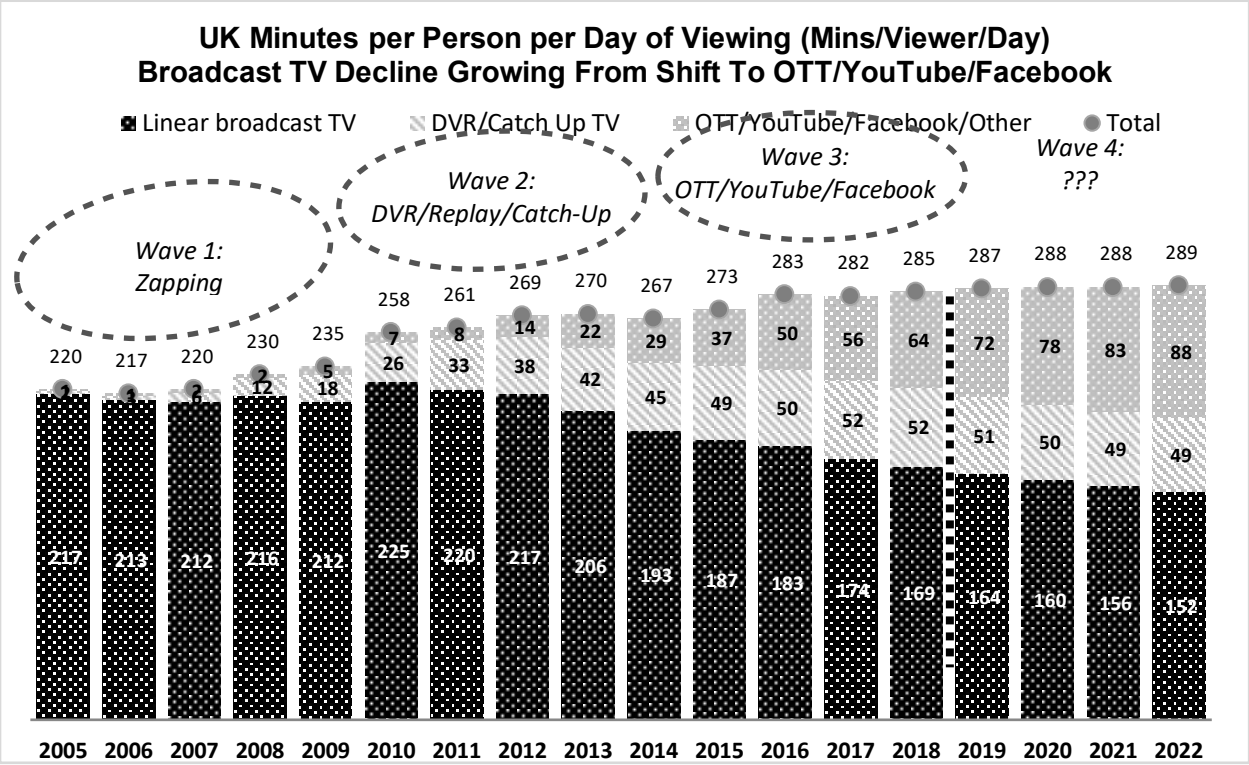


Figure 1 - Video Viewing Is Growing But Broadcast Live Linear TV Is In Decline[i]

Several studies in early 2019 have revealed that the number of linear TV ads seen by 16 to 34-year-old viewers has fallen by a fifth compared with a year ago [ii]. Recently Bank of America Merrill Lynch warned that "seismic changes in the viewing habits of young people and sliding TV advertising revenues would hit broadcasting revenues and put pressure on broadcaster margins" [iii] . They also noted that "TV broadcasters were underestimating the declines in audiences and the threat from digital video services" [iv]. In mid-2019 OFCOM noted that, for the UK market, on-demand usage has increased "driven by increased use of subscription video-on-demand services such as Netflix and Amazon Prime Video", noting no change in the proportion of people watching broadcasters free catch-up services (BBC iPlayer, ITV Hub, All4 and My5) and declines for some age groups [v]. The report further drew attention to the fact that "declines in the amount of time spent watching live TV are more pronounced among younger audiences" with 18-24s watching 18 minutes less live TV per day than the previous year [vi].

It is clear that digital video services have experienced an "explosion of choice" across a range of new direct to consumer platforms, which is appealing to younger audiences and putting the traditional broadcast TV models under pressure.

An Explosion of Choice

Historically the TV experience was based on "scheduling", and the choices for the viewer were limited to zapping channels. With the evolution of PVR, Video On-Demand, and Replay TV that content could be viewed at different times of day at the discretion of the consumer. Now, with the addition of new viewing devices and direct to consumer app TV there is more choice than ever before.

Today, the viewer is faced with an array of devices and different user experiences for discovering content across many platforms, forcing them to spend more time in the discovery process. As shown in Figure 2, in the past the "what to watch" discovery process was relatively simple as it was largely "time" bound. Today, with the explosion of choice in direct to consumer video the discovery process more challenging and suited to younger audiences who are able to switch between apps and devices. This enables not just "time-shifting", but also "place-shifting", with viewing on potentially an array of different "devices" and multiple "TV apps". Thus it creates a new, more fragmented, viewing landscape.

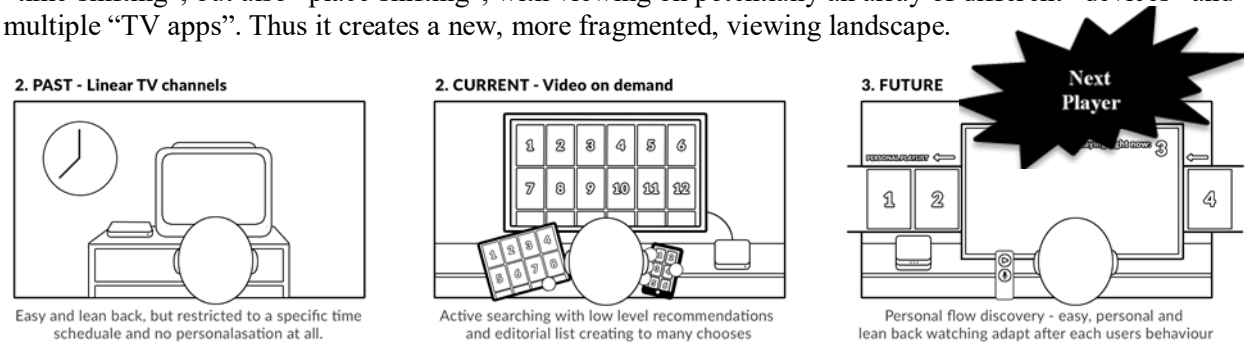


Figure 2 - Past, Current and Future TV Viewing

With emerging personalization capabilities, however, we may see a simplification of that fragmented viewing landscape in the future, where the TV experience follows the viewer; based on a machine-generated, personalized schedule or playlist. This will allow the viewer to spend less time browsing through endless box art tiles on an array of devices and more time enjoying the content.

What are the key market factors that may be accelerating the need for a personalized schedule or playlist? We see that despite viewers' limited time to discover TV content, there is increased competition in the video services market.

Increasing Competition for Viewer Time

We expect that with the addition of new streaming video services the amount of time spent browsing on each service will be even less. With Disney+, Apple TV Plus, HBO Max, Viacom and NBC Universal all launching into an increasingly competitive market [vii] and with more direct to consumer video services and subscribers [viii], we expect further pressure on the time a viewer has to spend searching for something to watch.

Netflix noted in a 2016 paper [ix] that the average subscriber spends 60 to 90 seconds scanning movies and TV shows on the platform before giving up; and in that time, the subscriber will roughly 10 to 20 titles—about three in detail—on one or two screens. If a viewer is splitting time between 3 different video services, there may only be 20 to 30 seconds of browse time per catalog, making first time right playlists and recommendation more critical than ever.

Figure 3 - Increasing Competition For Viewer Time

What enablers becoming available to address these challenges? We next explore what the technology enablers are behind the current explosion in choice, and how emerging personalization, artificial intelligence and machine learning may activate the next wave of market models and behaviors.

Technology Enablers of New Market Models & Behaviors

In the 1990's digital multi-channel zapping was the predominant TV experience. In the 2000s, with the emergence of low-cost personal storage, it become possible to record TV content. This enabled a new viewing behavior - "Time shifting" – in which TV content could be viewed at any time convenient for the viewer. By 2010 the Internet and Wi-Fi technology were ubiquitous enough to enable TV viewing on an explosion of new devices such as phones, tablets and HDMI sticks. This allowed TV viewing to be "Place shifted", with viewing no longer constrained to just the home or the living room. In turn, this also resulted in new types of TV apps and a direct to consumer model and a new type of viewing behavior - "Snacking" on TV content fueled by the rise of short form internet content providers.

As we enter the 2020s generation of viewing enablers we see that they are Personalization, Compute and Artificial Intelligence (AI). Applied to content as enablers these can support a move to "Person shifted" TV viewing, in which personal TV playlists can follow the viewer from device to device and computed or content fingerprint can form the basis for adaptive personal channels with new and interesting content options for the viewer without ever leaving the viewing experience.

Table 1 - Technology Enablers and Viewing Behavior Evolution

Format	Type	Year	Enabler	Browse Behavior	Viewing Behavior
Live linear Multi-channel	Scheduled	1990s +	Digital	TV Zapping/ Tune-in	Tune-in, Lean back
PVR, Video On-Demand, Replay	Time shifted	2000s +	Storage/ Return Path	EPG/ Interactive/ PVR menu	Recorded, Lean forward
New Viewing Devices, OTT, App TV	Place shifted	2010s +	W-Fi/ Mobile Internet/ App Stores	TV Apps "Launch"	On The Go Snacking
Personal Playlist, Adaptive-channel	Person shifted	2020s +	Personalization, Compute, AI, "Emotional Content Fingerprinting"	Playlist/ Follow-me	"Next" Binge

To support this hypothesis we propose a hypothetical "Next Player" that will leverage Personalization, content-focused AI and "Emotional Content Fingerprinting" to bring this new TV experience to the market and enable this next wave of viewing behavior.

PROPOSED NEXT PLAYER

What Is The Next Player ?

The proposed "Next Player" is video discovery service that can be presented to the viewer in the EPG, within the context of the viewers' personalization profile, but which is built as a playlist of on-demand assets. Of course, the challenge in doing this is in determining what content should be included in the playlist, in what order, and at what time in order to make the channel both valuable and engaging for the consumer.

These are similar classes of problem to that of producing on-demand recommendations for a consumer in a carousel, but with the added complexities of needing to take the selected personalization profile and most appropriate ordering of content into account.

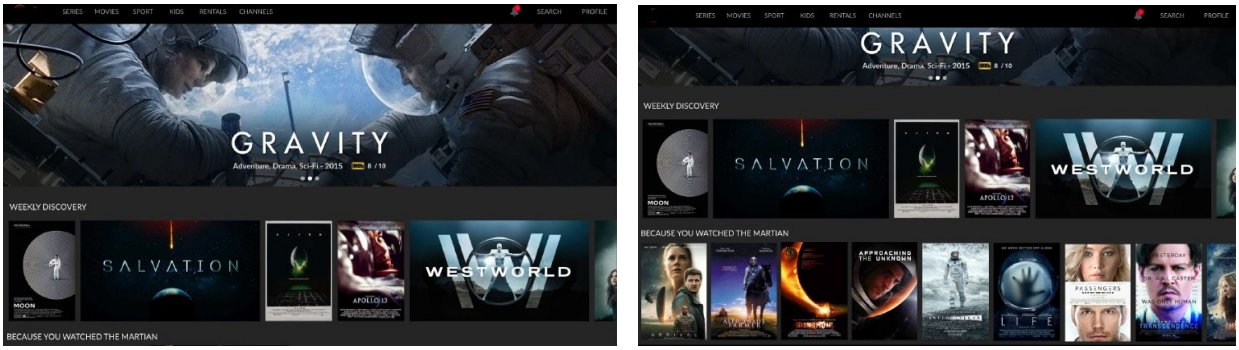


Figure 4 - Personal Carousels Made into Channels

What Components Are Existing ?

In developing the proposed Next Player, we assume that in an MVDP there will be existing content metadata, on-demand platform, content library, recommendation system and personalization service underpinning existing video services and available to support the proposed Next Player.

What's Components Are New ?

The key new element needed for the proposed Next Player is the addition of an 'Emotional Content Fingerprinting' service that can be combined with viewer personalization, to create personalized playlists per viewer.

For our approach we can summarize the existing and new components follows:

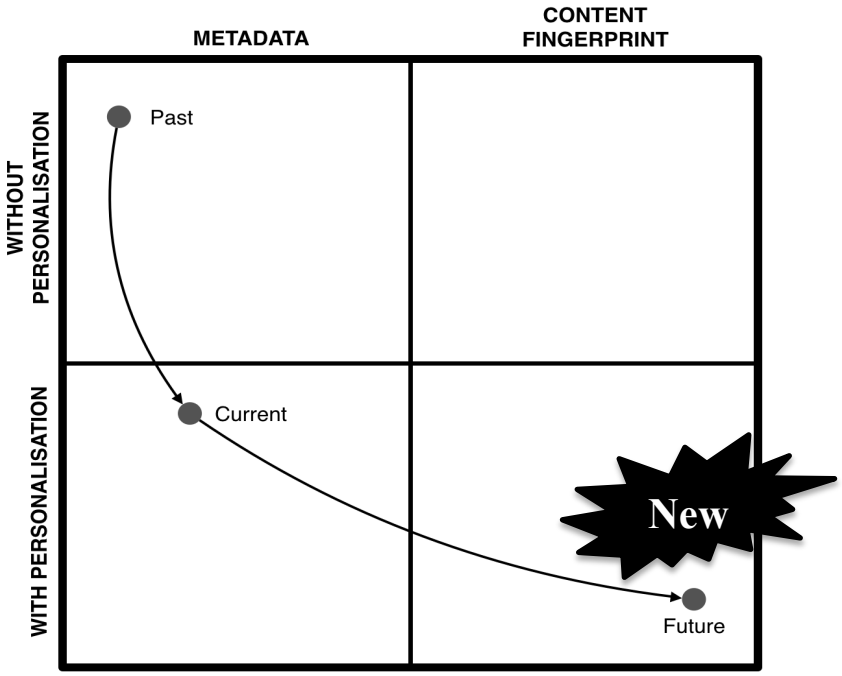


Figure 5 - Path To Future For Emotional Content Fingerprinting

1. Existing: Typical components that an MVDP will already have in place; such as existing Recommendation and Personalization service to support per viewer preferences.

2. New: The expected addition of a new "Emotional Content Fingerprinting" to produce high quality content similarity playlists.

Table 2 - Next Player Existing vs New Components

Existing	New
- On-Demand platform - Uniform Content Identification Structure - Recommendation platform - Personalization service - Bookmarking service - Ad insertion services	- Emotional Content Fingerprinting for Next Generation Content Similarity. - Content Discovery In-line (i.e. Ability to skip to "Next") - Personalized Playlist Discovery Via The EPG

Existing Components

On-Demand Assets

The foundation for the assets used as input in the creation of the weekly/daily Discovery can be driven from both SVOD, TVOD, Replay, Catch-up and Linear TV viewing as long as a uniform content identification structure is in place.

Uniform Content Identification Structure

The Next Player requires an existing uniform content identification structure, provided either by the MVDP or a 3rd party that can support a timely, consistent content identification between parties.

Recommendations

A recommendation service is a key foundation. The proposed way to create a weekly discovery is to base it on a watch history of the last assets viewed. If a larger sample of viewership exists we recommend that it be parsed based on time of day in order to create a channel that is dynamic over the day and that shifts with the time based viewing patterns. Once a customer has reached the end of a series, a new similar series or a movie could be recommended.

Personalization

A personalization service is needed to implement relevant recommendations. Channels are personal. Instead of the old way of serving one channel to all, the channels that we present are completely tailored to an individual or at the very least based on an existing personalization service for the viewer rather than being generic for the household. The requirement for amazing personalization is higher. If we fail to capture the viewer and do not show an in-depth understanding of the content viewed, the channels will become irrelevant and will fail.

Bookmarking

A bookmarking service is a key foundation, as "continue watching' is a key user experience capability. One of the most common behaviors in OTT/On-demand viewing is resuming the last watched episode or movie and therefore bridging that experience into the main screen and lean back EPG behavior is a very natural step. This Channel-type can be created from a separate Movie title and would then function in a similar fashion as the "Because you watched…" channel creation, or would be based on a series viewership where the next available episode would automatically start playing.

VOD Ad Insertion

In order to support advertising within the Next Player playlist, an VOD ad insertion platform able to support the ad decision and ad serving, is also a key foundation.

New Components

Emotional Content Fingerprinting

Determining content similarity is the key new capability required for the generation of the "Next Player" channel. Excellence in this step is critical to providing programming that will represent value to the user.

Traditional approaches to determining content similarity have been based on the use of metadata, including such items as genre, release year, popularity and production principals (actors, directors, producers etc.). Provided that the metadata is consistent and of high quality (which it is not always) these techniques can provide a reasonable level of similarity measure. However, we believe that such methods miss out on many of the characteristics of audio-visual content that truly establish similarity. As the old adage goes "a picture is worth a thousand words" – and trying to condense the essence of a multimedia asset into even a moderate number of metadata fields is an unsatisfactory approach.

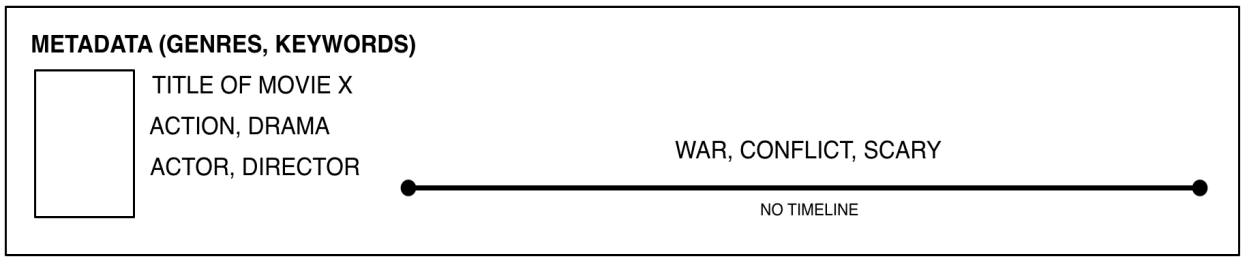
Over recent years advances in cloud computing and the ability to leverage high performance GPUs have in turn led to the democratization of artificial intelligence and advanced data analytics. In particular there has been much progress in the fields of deep learning neural networks with respect to network topologies for varying applications and training techniques. We can leverage these advances to enable content fingerprinting and similarity determination.

HOW IT WORKS

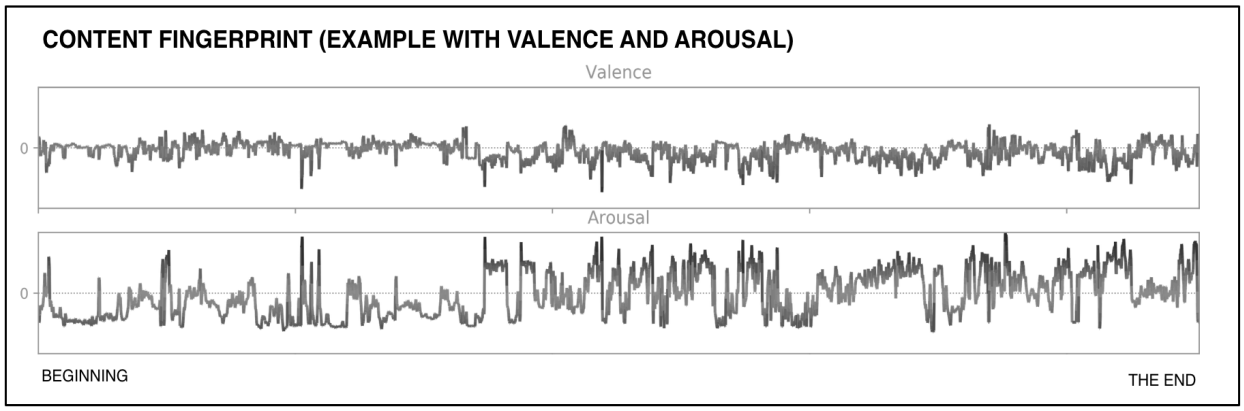
In order to determine how similar content assets are we compute numerical fingerprints for each piece of content using a variety of deep learning neural networks. These neural networks extract features from the video and/or audio components of the content over the complete timeline of the assets. Producers of content use a variety of visual and audio tools and techniques to tell stories, convey emotion and generally influence the consumers perception of the content. Examples are the emotional cues contained in soundtracks, color pallette employed, stress levels induced by speed of cutting etc. By analyzing the content for these features and determining how they develop through the timeline of an asset we are able to generate fingerprints that truly capture the essence of each asset in dimensions beyond just the subject matter.

Examples of the feature timelines are show in Figure 4, below. These demonstrate the development of emotional dimensions "valence" and "arousal" through a movie. Valence is a measure of how positive or negative an emotion is, Arousal measures the amount of energy in the emotion from calm and relaxed to intense and energetic. Such information is much richer than the aggregated information contained in conventional metadata and the inclusion of the sequence data in the fingerprinting of assets leads to vastly superior results in determining content similarity.

Once the numerical fingerprints for the assets are obtained it is possible not only to determine which assets are similar, but also to determine how similar they are and hence relative similarity measures amongst sets of content. This information can then be used to generate final sets of content for playlists.



No depth or timeline, single words to describe complex stories



More depth in the data as you can follow a stories evolvement

Figure 6 - Machine Process Content To Produce Emotional Content Fingerprint

A/B testing of the service to validate improvement

Together with the one of Nordics biggest TVOD and EST streaming services SF Anytime VionLabs A/B tested purely metadata based result with results that included emotional fingerprints.

The outcome of the test that started 2018 November on Web browsers was on 50% of the viewer base (total 900,000 viewers) over 6 month time. We saw a clear positive effect from using emotional fingerprints where the relevance of recommendations were leading to 27% more content added to the watch list, directly leading to an overall increase of 11% in total number of transactions. We attribute this success directly to the increased relevance of the recommendations through the strong correlation we saw where someone who added a piece of content to the watch list were 7x more likely to make a purchase. To summarize, more relevant recommendations leads to increased engagement (content added to watch list) which leads to increased revenue (11% increase in total transactions)"

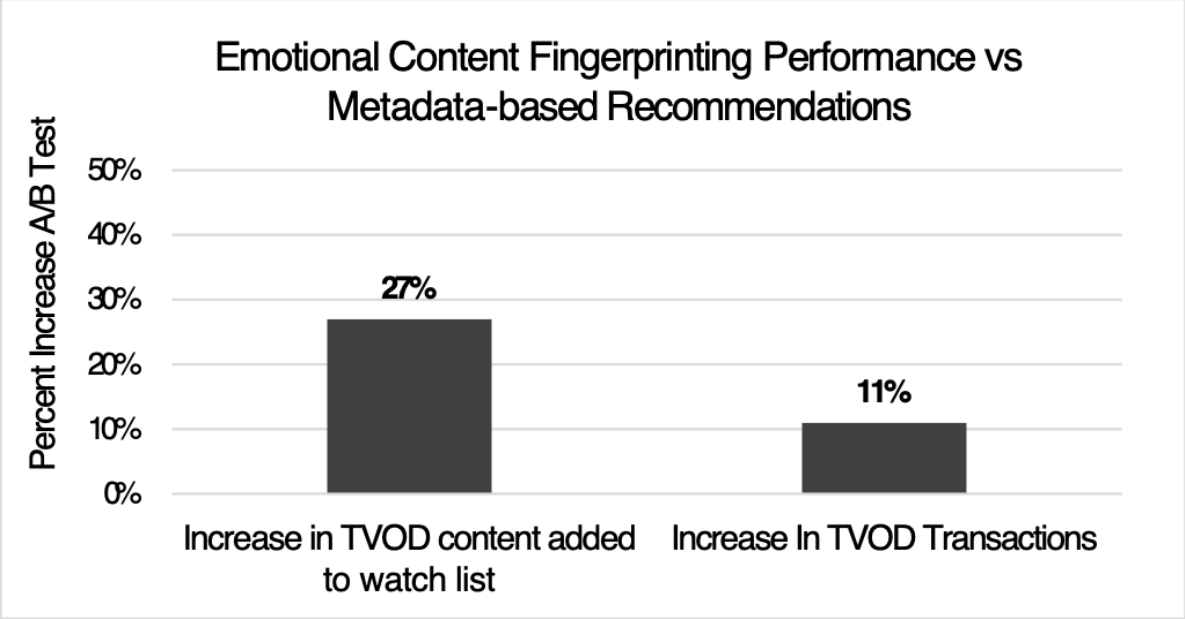


Figure 7 - Emotional Content Fingerprint A/B Test Shows Improved Performance

The engagement on SVOD was similar where the viewers with the emotional fingerprints added 3 times more content to their watch list and raising the amount of started streams with 25% monthly. Test also done over 6 months in 2018 on Web browsers on over 1,100,000 viewers.

THE KEY OPPORTUNITIES

We explore the key advantages of the proposed Next Player including a). New services and advertising revenues, b). Delighting viewers and improved Net Promotor score; and c). As a result lower subscriber churn or cord cutting.

New Services & Advertising Revenues

The Next Player concept activates a new advertising revenue possibility and creates currently untapped advertising inventory. The viewer acceptance of advertisements in a linear stream is higher than that during on-demand viewing. By creating linear channels we provide new inventory for ad-sales. Further, the Personalization of the channel has the possibility to further add to that value and enable a new level of targeted ad's.

We propose an estimated revenue model that is based on platform reach and share of total viewing attributed to the "Next Player". Assuming an eCPM of USD 25 based on Video on Demand ad inventory pricing [x] and a basis of one Ad per 30 minutes of viewing, we can proceed to model the revenue potential against the foundation penetration of the Next Player. We assume an upper limit of 80% of the video homes will have TV devices (i.e. Set-top) capable of running a "Next Player" application and an assume an engagement level upper limit that represents up to 10% of all the minutes spent viewing TV. In our scenario, the upper limit combination of 80% reach and 10% of viewing share results in a revenue potential of almost USD 14 per advanced video subscriber per year.

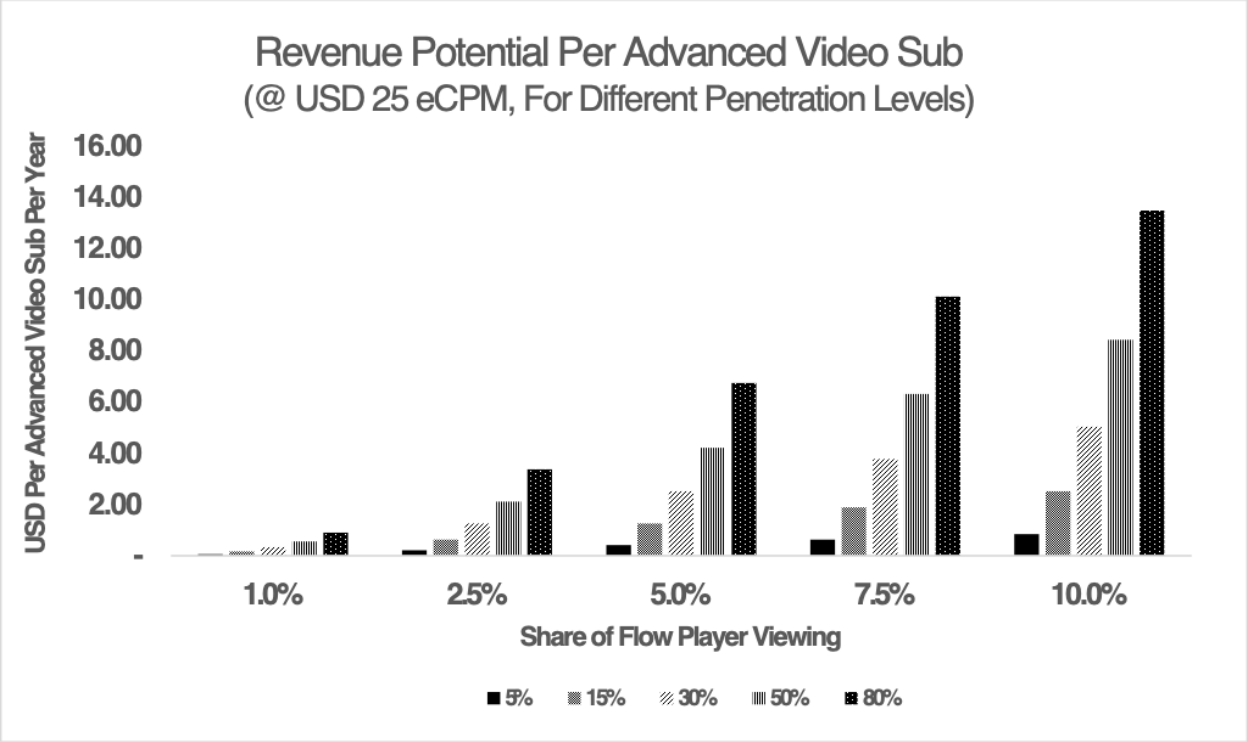


Figure 8 - Next Player Ad Revenue Opportunity

Improved NPS and Reduced Platform Churn

As competition increases for viewing between platforms it will become important to retain subscribers. Those platform able to benefit from increased engagement levels we could also reasonably expect to see lower churn and higher Net Promotor Score (NPS) for video platforms that deliver on the "Next Player" concept. Specifically, the Next Player viewing type would be expected to appeal to the younger TV viewing demographic - resulting in higher NPS and less churn for that group.

Deeper Viewing of the Content Library

We would also expect the advanced algorithms employed for content similarity to allow the Next Player to expose assets to consumers that would not normally be discovered through conventional means, allowing better exploitation of the entire content catalog. As a result, we expect the impact of personalized recommendations for a Next Player would also provide a boost to the perceived catalog size offered to the viewer vs the actual catalog size; where effective catalog size (ECS) is the spread of viewing across catalog items. Netflix research [xi] noted that recommendations provide an effective catalog size up to 4x larger when personalized vs popular only.

THE KEY RISKS

There is a risk that personalization and compute-based metadata capabilities result in viewing bubbles if poorly implemented, for example a) scale and device reach is limited; b) the personalization implementation is limited or not used by the viewer; and c) where new content paths are not made available the viewer limiting new experiences and making the Next Player less engaging [xii].

On Demand Content

It is clear that for the Next Player concept to be successful it requires scale, so that it can be used by the largest possible base of viewers. Critical factors in achieving that scale include an existing VOD planform, existing Replay and Catch-up content library.

Personalization Capabilities

To achieve the scale needed, a key risk is the lack of cross platform personalization capabilities. At a minimum it is envisaged that the same personalization service could be leveraged between device viewing types TV, Tablets, Phones, and PC's.

Limited Paths To New Content

A key risk is that the Next Player implementation is unable to easily introduce new types of content into playlists, resulting in a "Rabbit-hole" type execution where the viewer in never exposed to new content. This is a critical consideration, as limiting the seeding of new content in the playlist can potentially limit the engagement and repeat viewing of Next Player playlists.

Content Length Considerations

Platform in the music industry have demonstrated the successful use of personalized playlists to drive platform engagement, with Spotify's Weekly Discovery; and also music video with YouTube Music's "Your Mixtape Endless Personal Music". Selecting a 3 minute song as the media for a personalized playlist, however, would most likely allow for a higher tolerance for inaccuracy than a 30 minutes TV show, or a 120 minute movie.

Conclusion

The paper has outlined the concept of the "Next Player" application – a personalized linear channel of playlist, on-demand assets built on a combination of existing video platform capabilities and the additional of deep understanding of content similarity with the available content catalog.

The need for this is based on an understanding of a changing pattern of user behavior enabled by new services, applications and technologies. It is believed that these types of approach can be employed to re-energize the traditional TV business model and increase consumer engagement by providing tailored content that appeals to them on a personal level whilst removing the need for active decision making on their part.

Additionally it has been shown that there is the potential for significant revenue gain through the availability of new advertising spots within the "Next Player" service. This leverages the insight that viewers have a higher toleration of advertising within linear channels.

Further we outlined the potential risks and pitfalls; particularly in the areas of readiness and execution; including 1). on demand content needs to be available, 2) personalization capabilities need to be in place, 3). avoiding "Rabbit-hole" execution where viewers never experience new types of content; and 4) Content length considerations and the tolerance for accuracy.

In summary, with the explosion of video choice, we see a risk that viewers will become paralyzed by the multitude of options, with the viewers having a diminishing share of time to browse and discover new content within each video service.

Now is the right time to leverage advances in Machine Learning and AI to develop an appealing and engaging "lean-back" experience back to video consumption. With an improved content similarity capability, combined with platform personalization services, and the right execution, there is an opportunity to revitalize the linear TV experience; taking content assets that largely already exist on platforms today but bringing them out of the traditional on-demand catalog and into a new playlist-based viewing experience.

Abbreviations

AI	Artificial Intelligence
API	Application Programming Interface
eCPM	Effective Cost Per Mille
ECS	Effective Catalog Size
Emotional Content Fingerprinting	AI-based analysis of content libraries for emotional similarity.
EPG	Electronic Program Guide
GPU	Graphics Processing Unit
JSON	JavaScript Object Notation
Linear TV	The Experience of Viewing Content In A Sequential Manner
Live Linear TV	Traditional Scheduled Live Broadcast TV
ML	Machine Learning
MVDP	Multichannel Video Distribution Platform
NPS	Net Promotor Score
Personalization	Typically User Created Profiles Representing an Individual
Playlists	A Manifest of Content For Playing
PSB	Public Service Broadcaster
SCTE	Society of Cable Telecommunications Engineers
SVOD	Subscription Video on Demand
TVOD	Transactional Video on Demand
VOD	Video On Demand

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