TiVo®

SUCCESS STORY

Personalized Content Discovery Drives Higher Content Consumption for a Leading Pay-TV Provider

The Power of Personalized Recommendations

A pay-TV provider wanted to ensure its personalized content discovery tools were performing at optimal levels. To do this, the provider turned to the TiVo Professional Services team and the Seamless Insight® platform to analyze ROI.

With the implementation of TiVo's Seamless Discovery™, the industry's leading personalized content discovery platform, the pay-TV provider delivered personalized recommendations to over one million web and mobile viewers via carousels such as "Suggested for You," "You Might Like" and "Recommended Genres." TiVo helped the the pay-TV provider understand how personalized content discovery delivered by the Seamless Discovery platform drives overall content consumption and subscriber engagement. Specifically, our analysis looked to answer the following question:

Are subscribers who use personalized content discovery truly finding and consuming more relevant programming?

Analyzing the Right Data Points

Since different types of content discovery functionality must be measured in different ways, analyzing the performance of content surfaced through various means (e.g., search, recommendations, "More Like This", etc.) can be a complex and challenging task for most video service providers. However, our pay-TV customer was fully prepared and able to gather and send us all necessary data via the Seamless Insight platform. TiVo's Professional Services team then used the platform to research, analyze and answer the question, "Are personalized recommendations contributing to an increase in content consumed and overall product engagement on web and mobile apps?"

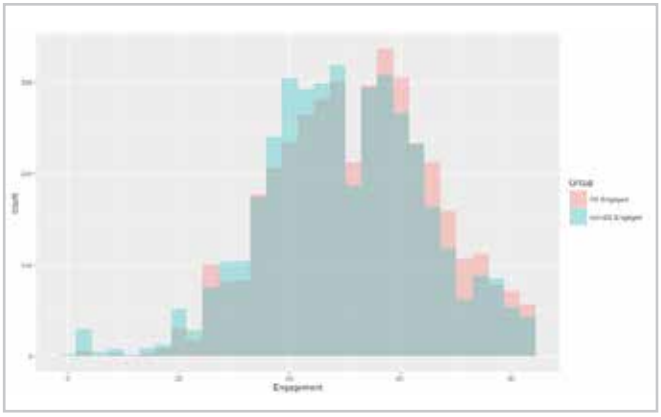
We know it is imperative to evaluate personalized recommendations in a broader light, so as of 2016, TiVo adopted Effective Catalog Size (ECS), a metric introduced by Netflix which aides in analyzing the efficacy of personalized content discovery. ECS[1] monitors how many catalog items (TV shows, movies, sporting events, etc.) are typically watched in order to understand long-term consumption trends. When a group of viewers consumes more programming, ECS increases; conversely, the number drops if that group watches less.

Note: ECS can be calculated at both the individual level (i.e., how much an individual consumes) and at the group level (i.e., how much a group consumes). For this pay-TV provider's analysis, ECS was analyzed at both levels.

Identifying Viewer Groups

By leveraging Seamless Insight's Customer Segmentation functionality, TiVo's Professional Services team was able to break down the population of the pay-TV provider's web and mobile subscribers into two sets[2], defined as the following:

- **Personalization Users:** Subscribers on the web and mobile apps who engaged with personalized content recommendations surfaced by Seamless Discovery.
- **Non-Personalization Users:** Subscribers on the web and mobile apps who did not click or view any content presented to them through Seamless Discovery, but utilized other discovery mechanisms (i.e., the pay-TV provider's guide, search and promotions) to locate programming.



Engagement for the Personalization Users group (red) vs. Non-Personalization Users (blue)

1 See Appendix A for full definition of ECS.

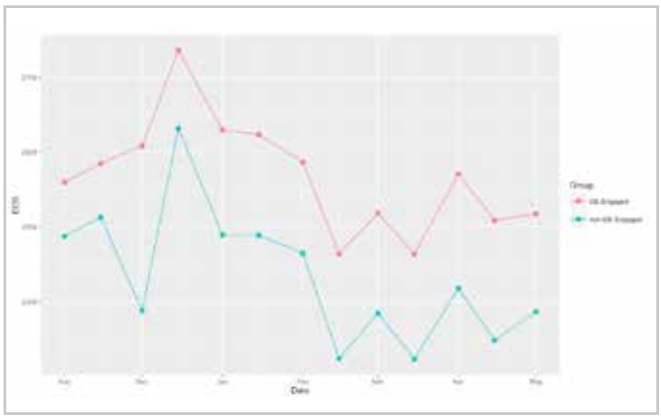
2 To achieve reliable statistical data analysis, we surveyed the same number of subscribers in each group – an amount in the hundreds of thousands – and eight months of historical data. Additionally, TiVo measured feedback events (a.k.a. implicit events) for both viewing behavior and engagement levels.

Once the team identified and classified these two groups, they needed to establish a baseline and confirm both groups could be fairly compared side-by-side. Once comparability was determined, an initial analysis found the engagement level of the two groups was almost identical; on a 100-point scale, average engagement was within five percentage points. (See illustration above.)

Measuring Content Consumption

While the two groups of viewers experienced a comparable level of engagement, their ECS levels varied considerably. The analysis found the ECS for the Personalization Users group was consistently 30% higher than that of the Non-Personalization Users group. Thus, if a subscriber interacts with personalized recommendations powered by Seamless Discovery on the pay-TV provider's web or mobile apps, s/he will most likely consume 30% more content than those who do not interact with personalized recommendations.

The chart on the upper left presents a histogram of the distribution of the ECS of the two groups at the individual subscriber level.



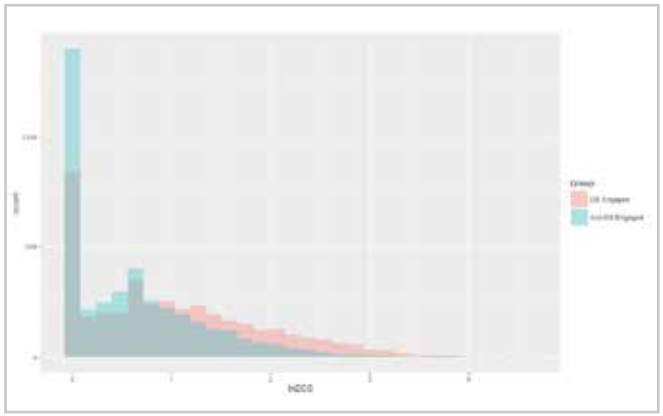
The red line indicates the ECS for the Personalization Users. The blue line indicates the ECS for the Non-Personalization Users.

Additional findings:

1. When analyzing the number of genres consumed by each group, the group with the higher ECS (Personalization Users) averaged one more genre per month than Non-Personalization Users.

2. When analyzing the number of titles consumed by each group, viewers in the higher ECS group consumed 1-2 more series per month. This further illustrates how personalized content discovery creates better engagement and inspires deeper enjoyment of content someone already appreciates.

3. At the group level, the Personalization Users group consumed 8 percent more channels than the Non-Personalization Users group.
   - This amounts to one addition channel at the individual viewer level – a significant increase since viewers typically consume 8-10 channels.[3]



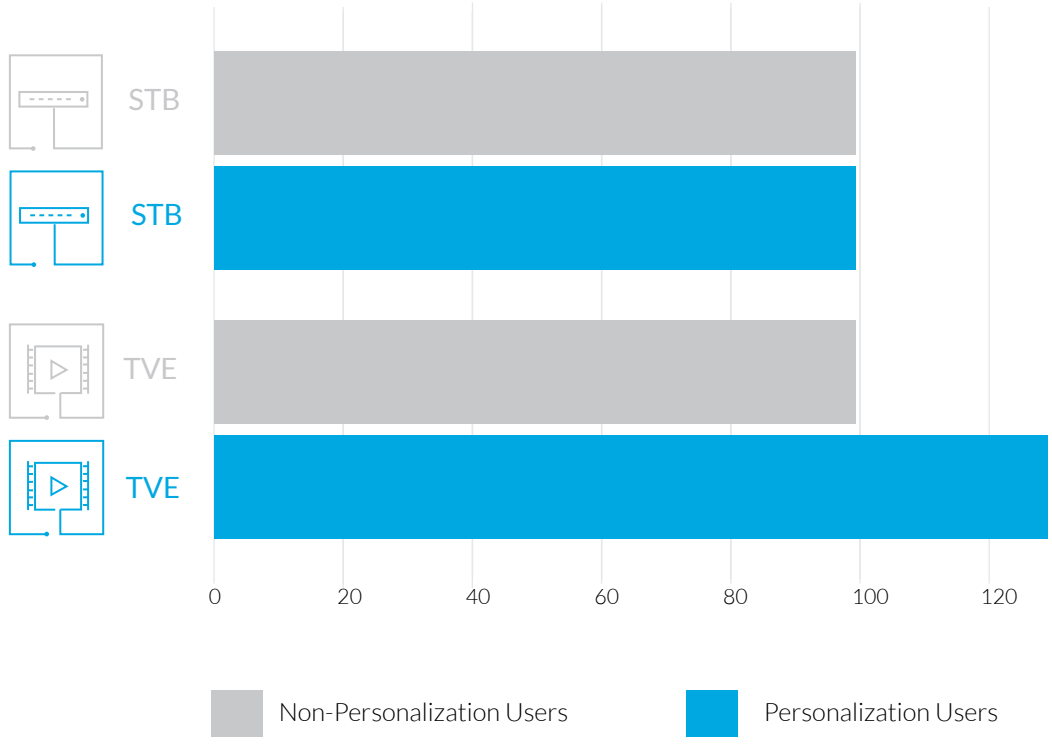
When comparing Personalization Users and Non-Personalization Users on the above histogram chart, the difference between the ECS of both groups is evident.

3 TiVo Q4 2015 Video Trends Report: Consumer Behavior Across Pay-TV, VOD, PPV, OTT, TVE, Connected Devices, and Content Discovery.

Comparing Results

The TiVo Professional Services team expanded their analysis by evaluating how the two groups (Personalization Users and the Non-Personalization Users) consume content on their set-top box (STB). It is important to note that unlike the other products analyzed, the STB did not have personalization enabled during the time of this analysis. TiVo observed the following results for the two groups:

- The ECS from the STB viewing only, for both the Personalization Users and the Non-Personalization Users groups, was within 0.2% (essentially identical); far lower than the difference between the two groups on the mobile and web platforms (30%).
- The number of genres and channels consumed by these groups was essentially the same for the STB.



The comparison of ECS for Non-Personalization Users vs. Personalization Users group, for STB, mobile and web apps. Actual ECS values are not shown; data are normalized to where both of the Non-Personalization Users' values are set to 100.

These findings were striking to the team at TiVo, as the STB did not contain any personalized content discovery solutions during the time period analyzed. They believe this is great proof of how much impact personalized content discovery has on the consumption of the catalog. When looking at a platform that does not contain TiVo's personalized content discovery (the STB), the benefits of personalized content discovery on the TV Everywhere (TVE) platform disappeared.

The key takeaway is that subscribers with access to high quality personalized content discovery functionality do indeed discover and consume more content, as evidenced by the increase in the number of series consumed per month and an increase in the number of channels watched after implementation by the pay-TV provider.

APPENDIX A: EFFECTIVE CATALOG SIZE (ECS) METHODOLOGY

ECS was introduced by Netflix researchers to understand long-term consumption trends for groups of viewers (Gomez-Uribe and Hunt, 2015; http://dl.acm.org/citation.cfm?id=2843948). Assume there are N items in the catalog available to a group. Then define a metric between 1 and N that reflects the breadth of the viewership across the catalog. Record the hours the group as a whole watched each item in the catalog as v1, … , vN sorted in decreasing order. Now, compute the proportion of time the group as a whole spent viewing the ith asset as pi=vi/j=1Nvj. ECS is then defined as:

ECS(p) = 2i=1Npii)-1

This computes the weighted average index number under p, rescaled to lie between 1 and N. For example, when all viewership is on only one item in the catalog, p = [1,0, … , 0], then ECS(p) = 2(1) – 1 = 1, which is the minimum value. When viewership is distributed evenly across all items in the catalogs such that p= [1/N, …, 1/N], then:

ECS(p)=2i=1N1Ni-1.
=2NN(N+1)2-1
=N.

While TiVo computed this version of ECS for the two groups, both Personalization Users and Non-Personalization Users, the measure was also applied to individuals to track with other individual-level metrics. In order to calculate at the individual level, define pu for each user, with the ordering of the catalog items specific to each user.

ABOUT TIVO

TiVo Corporation (NASDAQ: TIVO) is a global leader in entertainment technology and audience insights. From the interactive program guide to the DVR, TiVo delivers innovative products and licensable technologies that revolutionize how people find content across a changing media landscape. TiVo enables the world's leading media and entertainment providers to deliver the ultimate entertainment experience. Explore the next generation of entertainment at tivo.com, forward.tivo.com or follow us on Twitter @tivo or @tivoforbusiness.