# Game Analysis Report
# Harry Potter
# Hogwarts Mystery

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08.15.2021

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# Executive Summary

## Game Introduction and Background

- Harry Potter: Hogwarts Mystery is an RPG mobile game, where players can create their own characters and experience life as Hogwarts students from Year 1 to Year 7
- Launched in spring, 2018
- Partnered with Warner Bros; Inspired by J.K. Rowling's original stories
- Available on App Store and Google Play

## What We Need to Further Look Into…

- **Key Competitors:** similar game developers who already launched or potentially launch a Harry Potter themed RPG mobile game
- **Key Metrics for Growth:** the metrics that reflects revenue performance and user engagement performance, which can be used for prediction models
- **User Segments:** identifying user segments can help us better define the target groups
- **User Reviews:** periodically check the reviews on App Store, Google Play and Social Media platforms

# Major Competitors

| Game Name | Developer | Genre | Mode | Region | Launch Time | Devices/ Platforms | Unique Features |
|---|---|---|---|---|---|---|---|
| **Harry Potter: Wizards Unite** | Niantic, Inc. | Mobile Game, RPG | Multiplayer | US, UK, Australia, and New Zealand | June 21, 2019 | iOS, Android | Augmented Reality (AR) |
| **Harry Potter: Magic Awakened** | Hong Kong NetEase Interactive Entertainment Limited | Mobile Game, RPG | N/A | Mainland China, Taiwan, Hong Kong and Macau; Global soft-launch | September 2021 | iOS, Android | Card-based combat system |
| **Hogwarts Legacy** | Avalanche Software | Video Game, RPG | Single-player | N/A | 2022 | PlayStation 4 & 5, Xbox One, Xbox Series X & Series S, Android, Microsoft Windows | N/A |


# Game Reviews

# Bugs and UI Optimization

## Bugs

- Sometimes, scene loading takes a long time
- When the player logs back to the game, the storyline falls behind a little bit sometimes

## UI Optimization

- Usually, we can only reduce the scene loading time by sacrificing graphic quality or removing objects, but it's not the best solution. Instead, we can consider adding more interactive contents on the loading screen – e.g. "You've unlocked new outfits/pets. Hurry and take a look!"
- Provide a "skip" option for storyline repetition

# Pros and Cons

## Pros

- Nice narrative; the storyline is mostly matching the original books
- Smooth and high-quality animation
- Love the house rank and leaderboard feature, which can motivate the players to strive for a higher rank
- Love the memory & achievements logbook feature, where players can review the chapters and events completed
- Love the friendship and romance elements

## Cons

- Changing customized avatar part is bit confusing. We should let the player know at the very beginning of the game that only after reaching a specific level, will you be able to unlock more looks, outfits, decors and pets
- Constant tapping on objects to fulfill tasks may make players feel exhausted to move forward
- Completing a task requires a lot of energy; when the energy is used up, the player has 3 options to get energy refilled – 1) Wait; 2) Buy gems; 3) Watch an Ad video. Any of these 3 options may cause player's negative sentiment

# Recommendations (1/5)

## User Acquisition

- **Log in by social media account for new players:** If we have social media as one of the login options, players will be able to invite their friends to the game. We can encourage the referrals by offering bonus – in-game currencies
- **Maintain the marketing campaigns activeness on social media platforms:** Facebook, Instagram, YouTube, Discord or Twitch
- **Festival Season Promotion:** Give existing players more bonus for the referral to friends; and within the game, we can add more customized festival featured events – user experience improvement

# Recommendations (2/5)

## User Experience

- **Put more emphasis on interactive events:**
  - **Competitions** (we've already had): Quidditch World Cup, All-Wizard Tournament, House Cup
  - **Battles**: We've already had dueling club and challenging Merula storylines, but we can still add more plots like defeating villains (e.g. Voldemort, Umbridge, Bellatrix, etc.) before they gain control over the wizarding world.
- **Add a "Toolkit" feature:** The toolkit is somewhere the players can put the magical artifacts they've earned, such as magic stones, time turners, potions, cloak of invisibility, etc. Make magical artifacts also be useable in the "competitions & battles" mode

# Recommendations (3/5)

## User Experience

- **Add a “Map” feature:** Provide the players with a map displaying the entire view of Hogwarts, which would be helpful for them to locate to a specific place to complete a task
- **Add more HP themed background music:** e.g. Hedwig's Theme (if we can get the permission from the copyright owner)
- **Simplifying the process of fulfilling a regular task:** Make fewer taps required for completing a task and provide the players with options to either watch a short Ad video (10-30 sec) or wait. Most players won’t be willing to purchase gems for speeding up the task only

# Recommendations (4/5)

## User Retention

- **Provide a welcome-back bonus:** Some players may drop off the game for a long time period and log back in a certain time point. Welcome-back bonus could draw back players interests to continue to play the game. It could be provided in the format of some gains in energy/coins/gems, or the opportunity to unlock a new outfit/décor/pet directly
- **Develop a multiplayer mode:** It can make our game as one of the channels to maintain friendship for the players, and make them stay longer
- **Add a “Squad - House Chat” feature:** a chatroom for all players in the same house

# Recommendations (5/5)

## User Monetization

- **Add a “Coin/Gem Exchange Center” feature:** This place can be the exchange center where players can recharge the in-game currencies.
- **In-app purchase:** In-game currencies can be used mainly for buying magical artifacts/outfits/decors/magical creature’s feeds, skipping a level (sometimes players may want to experience Quidditch World Cup in Year 2 or All-Wizard Tournament in Year 5 ASAP) etc.

# Predictive Analysis

Predictive Analysis

# Key Metrics (1/3)

- **Total Number of Installs:** a key metric for benchmarking acquisition success
- **Daily Active Users** (DAU) & **Monthly Active Users** (MAU)
- **Stickiness Rate** (SR): DAU/MAU – how many monthly users are daily users?
- **Acquisition Rate** (AR): total number of people who opted in on a mobile marketing campaign divided by the total audience. It can be measured as AR per Channel (Facebook, Instagram, Twitter, Website) or Platform (App Store, Google Play)
- **Retention Rate** (RR): divide the number of Daily Active Users who are on their n day of play (remember download day = Day 0) by the number of people who downloaded n days ago, usually we can track this metric at a 1-, 7-, or 30-day cadence
- **Drop-off Rate** (DR): measures players that are dropping off and not engaging with a game. It's a way to understand why and where players are losing interest. Look at "bounce rate" or "exit rate"

Predictive Analysis

# Key Metrics (2/3)

- **Churn Rate** (CR): is the exact opposite of the retention rate, which measures the percentage of users that stop playing the game over a period of time. It's way to understand the number of lost players, i.e., those who uninstalled the game. It can be calculated as 1 - Retention Rate
- **Total Revenue** (TR): consists of in-app purchases and advertisements
- **Total Cost** (TC): Development cost and Ad spend
- **Average Revenue Per User** (ARPU): is a metric that will help us understand whether our business model/monetization strategy works (or not). Keeping a track of ARPU per channel/source can help us understand what channel is making us money. It can be calculated as total revenue divided by total number of paying users in a specific period of time (i.e. day – ARPDAU, week – ARPWAU, month – ARPMAU)
- **User Lifespan**: a time period in which a player engages with our game
- **Lifetime Value** (LTV): multiply ARPDAU by average user lifetime (days)

Predictive Analysis

# Key Metrics (3/3)

- **Average Transaction Rate** (ATV): defines the average value of an in-app purchase or transaction. It is calculated as total revenue divided by numbers of orders taken
- **Time to Purchase** (TTP): How much time has passed between the download and the first purchase? This metric can improve our ad placement and the things we offer in-game. Convert our users into buyers.
- **Cost per Install** (CPI): is done by dividing Ad spend with number of installs
- **Session Length**: the time the app was closed minus the time the app was opened
- **App Load Time**: it's important because slow load time would cause short sessions, drop-offs, and uninstalls

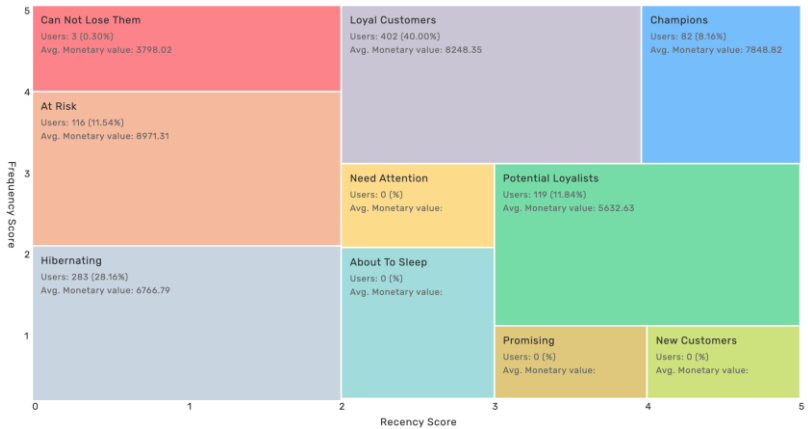
Predictive Analysis

# User Segmentation (1/2)

- Clustered by player's in-app purchase behavior (different tiers based on the total amount spent)
- Clustered by player's engagement behavior (very frequent, frequent, less frequent)
- Clustered by player's level (1-7 year)
- Clustered by demographic data (i.e. age, gender, location, occupation, income, etc.)
- Clustered by different device types (iOS vs. Android)

# User Segmentation (2/2)

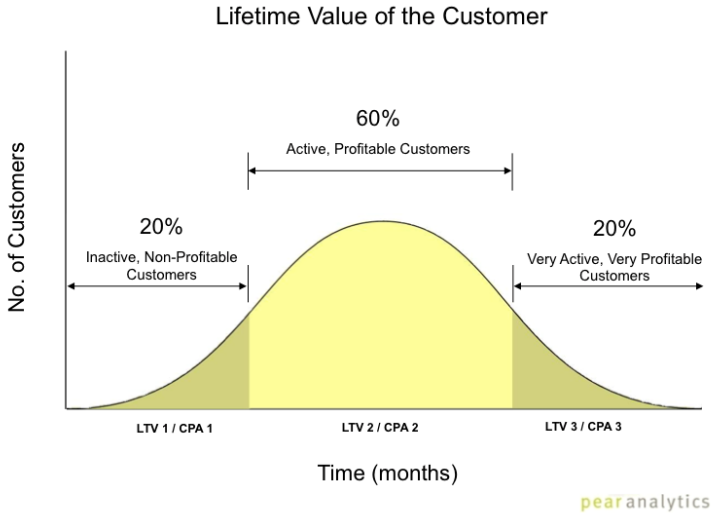
- How to segment users for user lifetime value prediction?
  - Apply RFM principles to cluster customers with K-Means – Unsupervised learning: Clustering (ML)
  - RFM stands for Recency - Frequency - Monetary Value.
    - ✓Recency — How recently did the customer purchase?
    - ✓Frequency — How often do they purchase?
    - ✓Monetary Value — How much do they spend?




RFM Dashboard

# User Lifetime Value (LTV) Prediction

- Using Supervised Learning: Classification Model (ML)
  - Define an appropriate timeframe (e.g. 3, 6, 12, 24 months)
  - Exploratory data analysis
  - Feature Treatment and Engineering
    - Identify the features for prediction and create them
    - Convert categorical columns to numerical columns
    - Check the correlation of features
    - Split feature set and LTV as x and y. Use x to predict y
    - Calculate lifetime value (LTV) for training the model
    - Create training and test datasets
  - Classification Modeling



Predictive Analysis

# Churn Prediction

- Using Supervised Learning: Classification Model (ML)
  - Exploratory data analysis
  - Feature engineering

    1- Group the numerical columns by using clustering techniques

    2- Apply Label Encoder to categorical features which are binary

    3- Apply get_dummies() to categorical features which have multiple values
  - Investigating how the features affect Retention by using Logistic Regression
  - Building a classification model with Decision Tree, Random Forest, GaussianNB, XGBoost

Predictive Analysis

# Revenue Forecasting

- Using Supervised Learning: Regression Model (ML)
  - Exploratory data analysis
  - Feature engineering

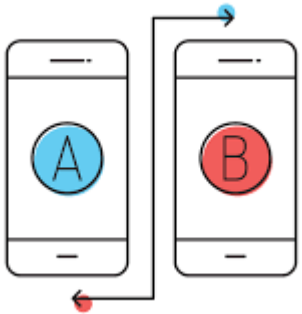
    1- Group the numerical columns by using clustering techniques

    2- Apply Label Encoder to categorical features which are binary

    3- Apply get_dummies() to categorical features which have multiple values
  - Investigating how the features affect Revenue by using Linear Regression
  - Selecting the best regression model with a greater R-Square (closest to 1)
  - Regression Modeling

# A/B Testing Design and Execution (1/2)

- A/B testing is a way for developers to conduct a controlled experiment between two versions of something (e.g. features & functionalities, UI design, monetization stack, user acquisition campaigns etc.) in the game to determine which is more effective. The audience can be segmented into two groups –
  - Control Group: Everything stays the same; no changes; current performance
  - Test Group: A new variable is introduced, and compare the performance with control group



# A/B Testing Design and Execution (2/2)

- Understanding business problem
- Exploratory data analysis (Missing Value, Outliers, Unexpected Value)
- Deep dive into the summary stats and plots
- Apply hypothesis testing and check assumptions
  - Check Normality & Homogeneity
  - Apply tests (Shapiro, Levene Test, T-Test, Welch Test, Mann Whitney U Test)
- Evaluate the results and make conclusions
- Recommend business decision to customer/director/CEO etc.

# Uplifting Model

- Incremental Return = Revenue generated from Test Group – Revenue generated from Control Group
- Revenue Lift = $\frac{\text{Revenue generated from Test Group – Revenue generated from Control Group}}{\text{Revenue generated from Control Group}}$ x 100%
  - If A/B testing works, incremental return > 0, revenue lift > 0
  - If A/B testing fails, incremental return < 0, revenue lift < 0
  - If A/B testing has no impact on the revenue, incremental return = 0, revenue lift < 0


# Thank you!