Churn Analytics Retention - KPI Definition Doc

Project: Streaming Subscription Churn Analytics
Company: Drillinsight
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Owner: Drillinsight Data & Analytics Team

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1. Purpose

This document defines the **Key Performance Indicators (KPIs)** used in the Streaming Subscription Churn Analytics initiative.
It provides:

- Clear metric definitions
- Business rationale
- Calculation rules and formulas
- Edge cases
- Data dependencies
- Examples

These definitions serve as the **single source of truth** for Product, Growth, Finance, and Data teams.

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2. KPI Framework Overview

The KPIs fall into five major categories:

1. **Subscription Metrics**
2. **Churn & Retention Metrics**
3. **Cohort Metrics**
4. **Engagement & Behavior Metrics**

5. **Model Performance Metrics**

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3. Definitions

3.1 Subscription Metrics

3.1.1 Active Subscribers

Definition:
Number of users with an active subscription at a given point in time.

Formula:

```
Code block
1   Active Subscribers = COUNT(users WHERE status = 'active')
```

Time Grain: Daily, Weekly, Monthly

Use Cases:

- MRR forecasting
- Active base monitoring
- Seasonal patterns

3.1.2 Monthly Recurring Revenue (MRR)

Definition:
Total subscription revenue expected from all active subscribers for a given month.

Formula:

```
Code block
1   MRR = SUM(price for all users WHERE status = 'active')
```

Notes:

- Does not include one-time promos
- Uses subscription plan price, not total_charges

3.1.3 Average Revenue Per User (ARPU)

Definition:
Average expected monthly revenue per active user.

Formula:

```
Code block
1   ARPU = MRR / Active Subscribers
```

Use Cases:

- Plan optimization
- Revenue segmentation

3.2 Churn & Retention Metrics

3.2.1 Churned User

Definition:
A user whose subscription has ended (cancel_date is not NULL).

Business Rule:
Use `cancel_date` for month attribution:

- Cancelled on **2024-03-15 → counts as March churn**

3.2.2 Monthly Churn Rate (Primary KPI)

Official Drillinsight Definition

```
Code block
1   Monthly Churn Rate = (# of churned users in month N) / (active subscribers at
    start of N)
```

Example:

- Active on March 1: 7,000 users
- Cancelled in March: 350 users

```
Churn Rate = 350 / 7000 = 5.0%
```

Rationale:
This definition aligns with SaaS industry standards and Finance expectations.

3.2.3 Retention Rate (Monthly)

Code block

```
Monthly Retention Rate = 1 - Monthly Churn Rate
```

Or explicitly:

Code block

```
Retention Rate =
(# users active at end of month N) / (# users active at start of month N)
```

Use Cases:

- Month-over-month retention tracking
- Comparing plans/segments

3.2.4 Customer Lifetime Value (CLV)

Formula:

Code block

```
CLV = ARPU × Average Customer Lifetime (months)
```

If lifetime = 1 / churn rate:

Code block

```
CLV ≈ ARPU / Churn Rate
```

Use Cases:

- Acquisition budget decisions
- Segment profitability

3.3 Cohort Metrics

Cohort = group of users grouped by **signup month** (default).

3.3.1 Monthly Cohort Size

```
Cohort Size = COUNT(users WHERE signup_date in cohort_month)
```

3.3.2 Cohort Retention Rate (Month N)

Definition:

Percentage of a cohort still active N months after signup.

Formula:

```
Cohort Retention (Month N) =
(# cohort users active in Month N) / (cohort size)
```

Example:

Signup Cohort = 1,000

Active in Month 3 = 720

```
Retention = 720 / 1000 = 72%
```

3.3.3 Cohort Churn Rate (Month N)

```
Cohort Churn (Month N) =
1 - Cohort Retention (Month N)
```

3.3.4 Rolling Retention

Definition:
User is considered "retained" if they are active **at any time after month N**, not necessarily every month.

Used in gaming & streaming.

3.4 Engagement & Behavior Metrics

Behavior comes from `user_events`.

3.4.1 Daily Active Users (DAU)

Users with ⩾1 event on a given day.

Code block

```
DAU = COUNT(DISTINCT user_id WHERE DATE(event_time)=date)
```

3.4.2 Weekly Active Users (WAU)

Users with ⩾1 event in the last 7 days.

Code block

```
WAU = COUNT(DISTINCT user_id WHERE event_time >= today-7)
```

3.4.3 Monthly Active Users (MAU)

Same logic but 30 days.

3.4.4 Engagement Score (Composite Metric)

Purpose: Quantify user activity level.

Suggested formula:

```
Engagement Score =
1 × (logins last 7d) +
2 × (watch events last 7d) +
1 × (clicks last 7d)
```

We weight **watch events** higher because they directly reflect product value.

Use Cases:

- Segmenting "low engagement → high churn risk" users
- Prioritizing retention campaigns

3.4.5 Silent Users (Critical Churn Indicator)

Definition:

Active subscribers with **zero events in last 60 days**.

```
Silent User =
status = 'active'
AND no events in past 60 days
```

Why important:

Silent users typically have **4–7× higher churn** probability.

3.4.6 Behavior Drop (30-day / 7-day)

Definition:

Percentage drop in engagement relative to previous period.

```
30d Drop =
(events in last 30d - events in previous 30d)
 / (events in previous 30d)
```

Users with >50% drop in 30 days or >80% drop in 7 days are flagged as **early churn signals** (industry standard).

3.5 Funnel Metrics

Funnel stages for streaming subscription service:

1. Signup
2. First Login
3. First Watch
4. Engagement (3 sessions within first week)
5. M30 Retention (still active after 30 days)

3.5.1 Funnel Conversion Rate

```
Conversion (Stage A → Stage B)
= (# reached Stage B) / (# reached Stage A)
```

Example:
Signup → First Watch

- Signup users: 1,000
- Watch at least one video: 750

```
Conversion = 750 / 1000 = 75%
```

Use Cases:

- Onboarding optimization
- Identifying friction points

3.6 Model Performance Metrics

3.6.1 Recall (Primary Model KPI)

Reason:

In churn prediction, **catching churners** matters more than avoiding false alarms.

```
Recall = True Positives / (True Positives + False Negatives)
```

Target:

- **Recall ⩾ 0.75** on top 20% predicted at-risk users.

3.6.2 Precision

```
Precision = True Positives / (Predicted Positives)
```

Used to balance outreach cost.

3.6.3 AUC (Area Under ROC Curve)

Measures overall model discrimination ability.

Target:

- **AUC ⩾ 0.75** acceptable
- **AUC ⩾ 0.80** strong for churn

3.6.4 Top-decile Lift

```
Lift =
(Churn rate of top 10% risk group)
 / (Overall churn rate)
```

Target:

- **Lift ⩾ 3×** indicates model usefulness

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4. KPI Ownership

KPI Category	Owner	Team
Subscription metrics	Finance	Revenue
Churn & retention	Product + Finance	Growth Analytics
Cohort metrics	Product	Analytics
Behavior metrics	Product Intelligence	Data Analytics
Model metrics	Data Science	Data Analytics

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5. Edge Cases & Exceptions

- Users with signup_date AND cancel_date in same month → count as churn in that month.
- Users with zero price plans (promos) → included but flagged.
- Users with event_time out of range → excluded from engagement metrics.
- Fake users (no subscriptions) are excluded from churn KPIs.
- Churn date must be ⩾ signup_date; if not, flag in data quality check.

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6. Data Sources

KPI	Table	Fields
Churn/ Retention	subscriptions	signup_date, cancel_date, status
Cohorts	subscriptions	signup_date
Engagement	user_events	event_time, event_type
Segmentation	users, subscriptions	demographics, add-ons
Pricing / Revenue	subscriptions	price, plan

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7. Version History

Version	Date	Notes
1	12/4/2025	Initial KPI definitions