

DELIVERY HERO

PRODUCT PROJECT

Payment Orchestration Engine

A product strategy to move from reactive, manual firefighting to autonomous, data-driven PSP routing

Affected Markets

sg Singapore · tr Turkey · ar Argentina

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What we'll cover today

01 Problem Framing

02 Root Cause Analysis

03 Proposed Solution

04 System Framework

05 Feature Breakdown

06 Prioritized Backlog

07 Sprint Plan

08 Market Rollout Strategy

09 Risks & Trade offs

10 Edge Cases

11 Metrics & Monitoring

12 Q&A

A 2.2pp drop in payment success is a system signal.

89.3%

Current Success Rate

was 91.5% three weeks ago

-2.2pp

Drop in 3 Weeks

across SG, TR, AR markets

3 Markets

Affected Simultaneously

suggests systemic root cause

Why this matters

- ① Every failed payment is a lost order, direct revenue impact at millions of transactions/day
- ② Manual PSP traffic-shifting is slow, inconsistent and doesn't scale across 50+ markets
- ③ Payment failures decrease customer trust and inflate support costs
- ④ Reactive fixes treat symptoms; we need a product that prevents failure in the first place

So what?

Ex. 5M card transactions/week, avg. basket size 15€, 2.2pp decrease → ~1.65M€ weekly gross GMV loss

02 ROOT CAUSE ANALYSIS

Framing hypothesis before jumping to solutions

PSP

PSP-Side Degradation

- One or more PSPs in SG/TR/AR experiencing higher decline rates
- Could be infrastructure issues, bank-side rule changes, or fraud filters tightening

NET

Network / Bank Shifts

- Issuing bank policy changes (e.g. 3DS enforcement, BIN-level rules)
- Local regulatory changes in Argentina (FX controls, card limits)

TRX

Transaction Mix Change

- Higher-risk card types or new merchant categories increasing in volume
- International cards routed through domestic PSPs without proper BIN routing

OPS

Orchestration Config Gap

- Current routing logic is static - no dynamic adjustment to performance signals
- Ops-triggered manual shifts are delayed by hours, missing the performance window

Most likely: PSP downtime + static routing config -> requires an intelligent orchestration layer

Investigation approach

PSP

PSP-Side Degradation

1. PSP-level failure analysis (%succes, %traffic)
2. Issuer decline analysis
3. 3DS authentication failures
4. Payment latency
5. Merchant category , market, basket size

DEC

Decline Code Analysis

1. Map the decline codes per PSP (Soft/Hard/Technical/Fraud)
 2. Redesign retry and routing strategy
- Hard/fraud declines should not retry aggressively

Metric	Reason
PSP success rate	PSP degradation?
Issuer decline rate	Bank policy change?
3DS challenge rate	SCA issue
Timeout rate	Infra problem
Merchant category mix	Fraud filters

Decline Reason	Fix
Insufficient funds	Retry later
Do not honor	Route different PSP
3DS required	Trigger challenge
Issuer unavailable	Retry
Decline reason	Fix

Introducing: APEX

Adaptive Payment Experience Engine · Real-time · Rule-based · ML powered

A real-time, ML-informed payment routing layer that continuously learns from transaction outcomes and automatically shifts PSP traffic to maximize success rate without manual intervention.

1

Real-Time Scoring

Score each PSP per market, card type, merchant category, transaction amount, device, PSP health, and time window

2

Intelligent Routing

Route each transaction to the highest-scoring PSP using configurable, deterministic rules (P0) + ML model (P1)

3

Auto Failover

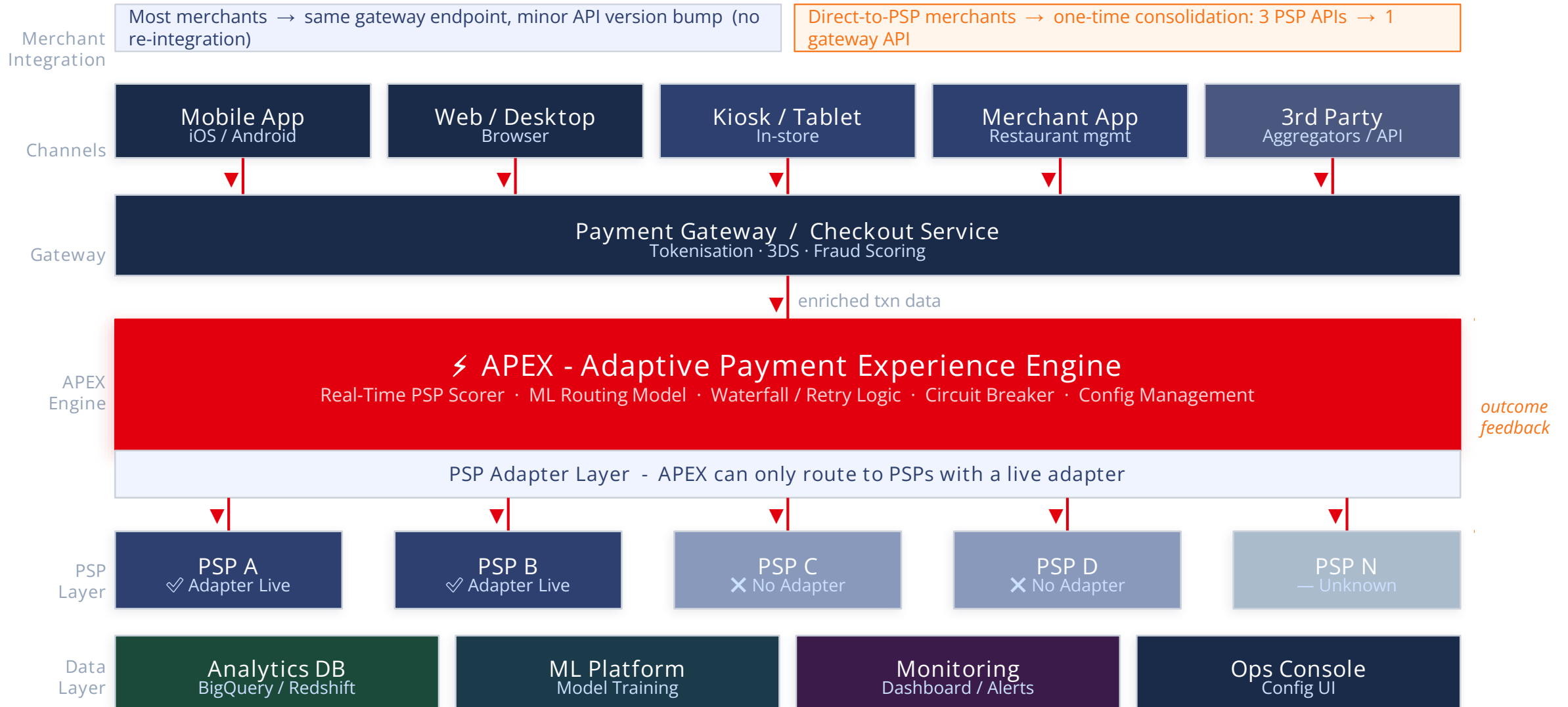
Detect degradation within minutes and reroute traffic, no ops team required

4

Feedback Loop

Capture outcomes, retrain models, continuously improve routing over time

04 SYSTEM FRAMEWORK - APEX in the Wallet Ecosystem



✗ No Adapter = APEX cannot route there

05 APEX - KEY FEATURE BREAKDOWN

CORE

PSP Performance Scorer

Real-time health score per [market × card type × time window].
Inputs: success rate (rolling 5-min), latency p95, error codes. Output: 0–100 score refreshed every 60 seconds.

CORE

ML-Based Routing Model

Gradient-boosted model predicting best PSP per transaction.
Features: issuing country, BIN, amount, device, time-of-day, MCC.
Fallback: rule-based if confidence < threshold.

RELIABILITY

Circuit Breaker & Auto Failover

PSP score drops below threshold (default: 70) for 3+ windows → APEX auto-opens circuit, stops routing there until recovery confirmed.

RELIABILITY

Waterfall Retry with Cascade

Failed txn on PSP A → retry on PSP B within 5 seconds. Retry logic respects bank decline codes to avoid retry fatigue. Max 2 retries per transaction.

INTELLIGENCE

Feedback Loop & Model Retraining

All transaction outcomes streamed to ML platform. Model retrains nightly; champion/challenger framework validates before full rollout.

CONTROL

Ops Configuration Console

Ops/product teams set PSP minimums, override routing rules, whitelist/blacklist PSPs, and view live dashboards. Full human override always available.

06 PRIORITIZED BACKLOG

⚠ Key assumption: Existing PSP integrations are live. If not, Sprint 0 (discovery) is mandatory before any build work begins.

#	Feature	Phase	Priority	ICE	Owner
★	PSP Adapter Framework + Error Code Normalization [Platform Track owned by gateway/platform eng, parallel to APEX build]	MVP	● P0	—	Platform
0	Technical discovery: PSP audit, data pipeline readiness, checkout service assessment	Sprint 0	● P0	—	PM + Eng
1	PSP outcome event pipeline + error code standardization	MVP	● P0	72	Data Eng
2	Real-time PSP health scoring service (rolling 5-min window)	MVP	● P0	70	Backend
3	Rule-based routing engine + ops config schema	MVP	● P0	66	Eng + PM
4	Shadow mode integration with payment gateway	MVP	● P0	64	Backend
5	Circuit breaker + PagerDuty alerting	MVP	● P1	58	Backend
6	Ops console v1 (read-only live dashboard)	MVP	● P1	54	Frontend
7	Waterfall retry with cascade + idempotency guard	MVP	● P1	52	Backend
8	ML routing model v1 + outcome feedback pipeline	Phase 2	● P1	48	ML + Data
9	Champion/challenger framework + A/B test infra	Phase 2	○ P2	40	ML + Eng
10	Global rollout automation + per-market config	Phase 3	○ P2	34	PM + Ops

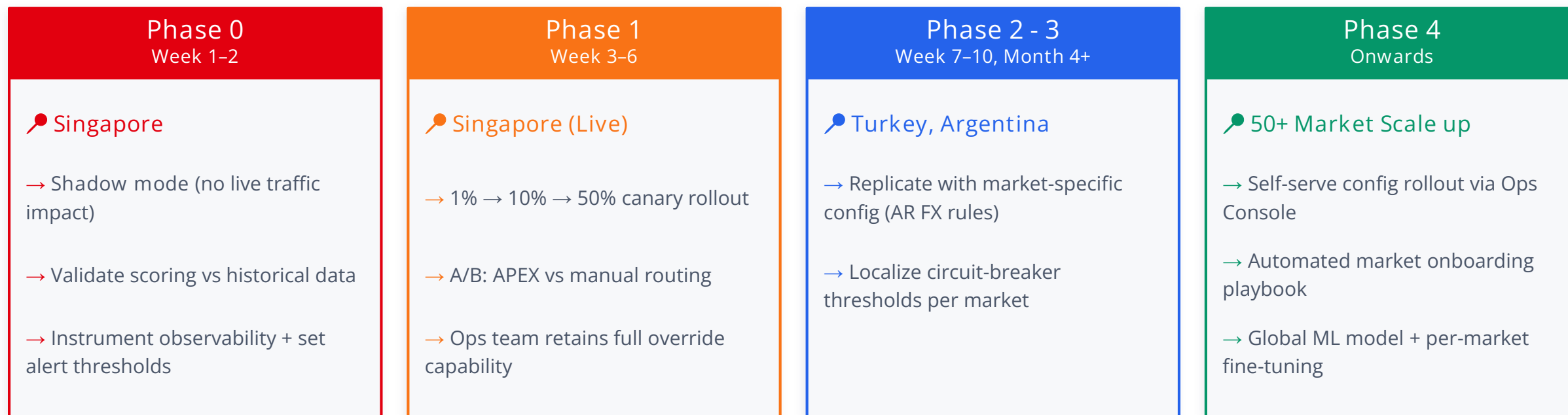
07 SPRINT PLAN - MVP to Shadow Mode Live (Singapore)

Key assumption: ≥ 2 PSP adapters are live per market. APEX can only route to PSPs the gateway can physically reach. If only 1 adapter exists, adapter development is the critical path, not routing logic.

Sprint 0 Week 1-2 (conditional)	Sprint 1 Week 3-4	Sprint 2 Week 5-6
Goal: Technical Discovery	Goal: Core Infra	Goal: Shadow Mode + Circuit Breaker
D-012pt PSP adapter audit per market PM + Eng · Which markets have ≥ 2 live PSPs adapted?	S-018pt PSP outcome event pipeline Data Eng	S-058pt Shadow mode gateway integration Backend
D-022pt Data pipeline readiness check Data Eng ·	S-028pt PSP health scoring service Backend	S-065pt Circuit breaker + PagerDuty alert Backend
D-033pt Checkout service assessment Backend	S-035pt Rule engine + config schema Backend	S-073pt Ops console v1 (read-only) Frontend
D-041pt Stakeholder alignment PM · Finance, Legal (AR/TR rules), Ops	S-043pt Monitoring dashboard Data Eng	S-083pt Shadow mode validation in SG PM + QA · Compare APEX decisions vs manual Ops

Definition of done for Sprint 2: Shadow mode live in SG, APEX decisions logged for 5 days, circuit breaker tested, no regressions in checkout flow

A phased, data-validated rollout plan



Rollout gating criteria: no fraud increase, authorization rate +1 pp, no checkout latency regression

Shadow APEX matches/beats manual ops in ≥80% of decisions

+1pp success rate at 50% traffic; no fraud/chargeback increase

Improvement across all 3 markets; ops escalations < baseline

Global success rate ≥ 92%; < 10 min mean time to auto-recovery

09 RISKS, TRADE-OFFS & CROSS-FUNCTIONAL CHALLENGES

Technical Risks

Model over-fitting to historical data

Champion/challenger framework; shadow mode validation before live traffic

Latency introduced by routing layer

Target <10ms p99; async scoring; in-memory cache for PSP scores

New PSP additions

New adapter, sandbox setup, error code mapping, results cold start for ML model

PSP webhook unreliability, missed outcome events corrupt PSP health scores (Polling)

PSP contract/SLA changes invalidating config

Abstract PSP config in ops console; align with Procurement upfront

Business Risks

PSP commercial negotiations complicated by auto-shifting

Set minimum traffic thresholds per PSP; align with stakeholders upfront

Short-term success rate dip during shadow mode

Communicate clearly; run shadow in parallel, not as replacement

Market regulatory constraints (e.g. Argentina FX rules)

Legal review per market; parameterize routing rules by regulation tag

Cross-Functional Risks

Ops team resistance to losing manual control

Ops Console gives full override capability; involve ops in sprint reviews

Finance needs predictable PSP cost allocation

APEX can optimize for cost-weighted routing as secondary objective

ML team bandwidth / shared platform access

Start with rule-based routing; ML is Phase 2

10 EDGE CASES – EXAMPLES OF GUARDRAILS

APEX automates routing decisions but operates within guardrails set by Ops, Finance, and Legal

↓ Minimum Traffic Thresholds

Protects commercial contracts with PSPs

Owned by: Finance + Procurement → configured by PM

PSP Contract - Singapore

Scenario: APEX detects PSP A's success rate dropping and wants to shift 100% traffic to PSP B.

Risk: DH has a contract with PSP A guaranteeing minimum 10M transactions/month. Falling below triggers a penalty clause and risks losing preferential rates.

✓ **Guardrail:** Floor set at 15% minimum allocation for PSP A. APEX cannot route below this regardless of score. Finance reviews floor quarterly.

Mercado Pago - Argentina

Scenario: APEX wants to reduce Mercado Pago allocation due to a temporary latency spike.

Risk: Mercado Pago dominates Argentina card market. Dropping below a threshold causes checkout abandonment - customers expect to pay with MP.

✓ **Guardrail:** MP floor set at 45% for AR. Separate from performance routing as it's a market reality.

↑ Maximum Traffic Thresholds

Prevents dangerous single-PSP concentration

Owned by: Risk + Engineering → configured by PM

Concentration Risk Ceiling - Global

Scenario: PSP B is scoring highest across all markets for 3 consecutive days. APEX wants to send 85% of global traffic to it.

Risk: If PSP B has a 1-hour outage at peak time, 85% of transactions fail simultaneously. Recovery takes longer than a diversified setup.

✓ **Guardrail:** No single PSP can exceed certain % of traffic in any market. For strategic PSPs, ceiling can be raised to 70% with risk sign-off.

New PSP Onboarding Ceiling - Turkey

Scenario: A new Turkish local PSP (e.g. PayTR) has been integrated and is showing strong early scores.

Risk: Early performance data is limited - only 2 weeks of signal. Model may be over-confident on sparse data.

✓ **Guardrail:** New PSPs capped at 10% traffic for first 4 weeks. Cap lifts automatically after confidence threshold is met (min 50K transactions + stable score).

👤 OVERRIDE / Human Override

For decisions APEX cannot and should not make autonomously

Owned by: Ops / PM / Legal → via Ops Console or hotline

Regulatory Event | Ex. Argentina, midnight

Scenario: BCRA (Argentine Central Bank) publishes a new FX control regulation at 11pm affecting card routing.

Risk: APEX's ML model won't see this signal until overnight retraining. Meanwhile, non-compliant routing could expose DH to regulatory risk.

✓ **Guardrail:** On-call engineer updates new regulation tag in Ops Console. Override takes effect immediately, no code deploy, no model retraining needed.

Commercial Negotiation

Scenario: DH is in active renegotiation with PSP C for better rates. PSP C requests higher traffic share as leverage.

Risk: This is a business decision, not a performance decision. APEX has no visibility into commercial negotiations.

✓ **Guardrail:** PM sets a temporary manual override allocating +10% to PSP C for 30 days. APEX operates within this constraint. Override auto-expires.

11 METRICS & MONITORING FRAMEWORK

North Star: Card Payment Success Rate $\geq 92\%$ across affected markets within 8 weeks of APEX going live

Product Metrics

Card Payment Success Rate

Target: $\geq 92\%$ (from 89.3%)

Cadence: Real-time

PSP-level Success Rate

Target: Track per PSP/market

Cadence: 5-min rolling

Retry Success Rate

Target: $> 60\%$ of retried txns

Cadence: Hourly

Mean Time to Auto-Recovery

Target: < 15 minutes

Cadence: Per incident

Operational Metrics

Circuit Breaker Activations

Target: Trend down over time

Cadence: Daily

Manual Ops Overrides

Target: < 2 per week (from daily)

Cadence: Weekly

Routing Decision Latency

Target: $< 10\text{ms}$ p99

Cadence: Continuous

Model Confidence Score

Target: > 0.75 avg

Cadence: Per prediction

Business Metrics

Revenue Recovered

Target: $+ \sim 2\%$ GMV from fewer lost orders

Cadence: Weekly

PSP Cost per Transaction

Target: Neutral or improved

Cadence: Monthly

Customer Complaint Rate

Target: $\downarrow 20\%$ vs baseline

Cadence: Weekly

Fraud / Chargeback Rate

Target: No increase

Cadence: Daily

More importantly, internal user satisfaction measurements should be under radar to ensure organizational adoption

DELIVERY HERO

PRODUCT CASE STUDY

Q&A

