

PROJECT TITAN SCORING MODEL GOVERNANCE

Document: Titan_Scoring_Model_Governance_v1.8.pdf

Status: Approved | Version 1.8 | Effective Date: November 1, 2023

Owner: Model Risk Management Committee

Audience: ML Engineers, Risk Analysts, Compliance, Legal

1.0 MODEL PURPOSE & SCOPE

Governs the Titan Risk Scoring Model that converts signals from the Risk Signal Catalog into a unified 1-999 risk score. This document defines how decisions are made, not the signals themselves.

2.0 MODEL ARCHITECTURE

2.1 Approved Model Type

Primary: Gradient Boosted Decision Trees (XGBoost)

Ensemble: 100 trees, max depth 6

Learning Rate: 0.1 (fixed, non-configurable)

Objective: Binary logistic regression for fraud classification

2.2 Input Requirements

All inputs must come from the Titan_Risk_Signal_Catalog_v2.1.pdf

Minimum 300 signals active

Maximum 10% null values per transaction

2.3 Output Specifications

Score Range: 1-999

Interpretation: Higher score = higher fraud probability

Precision: Scores rounded to nearest integer

Refresh: Score generated per transaction in <100ms

3.0 SCORING FORMULA

3.1 Base Calculation

text

$\text{raw_score} = \sum(\text{signal_weight}_i \times \text{signal_value}_i) + \text{bias}$

$\text{final_score} = \min(999, \max(1, \text{round}(\text{raw_score} \times 100)))$

3.2 Signal Weight Boundaries

Signal Category	Min Weight	Max Weight
Identity (IDN)	0.01	0.25
Transaction (TXN)	0.02	0.30
Device (DEV)	0.01	0.20
Biometrics (BIO)	0.03	0.35
History (HIS)	0.01	0.15

Individual signal weights must sum to 1.0

4.0 FAIRNESS & BIAS CONSTRAINTS

4.1 Protected Attributes

The model must NOT create disproportionate outcomes for:

Geographic region (p-value > 0.05)

Age group (disparate impact < 0.8)

Transaction size quartile (error rate diff < 2%)

4.2 Bias Testing Requirements

Monthly: Full fairness audit

Quarterly: Third-party validation

Annually: Regulatory compliance review

4.3 Mitigation Procedures

If bias detected:

Freeze model deployment

Investigate signal contributions

Apply re-weighting within Section 3.2 boundaries

Re-test until compliant

5.0 REASON CODE GENERATION

5.1 Top Contributor Logic

For each score, provide top 3 signal contributors:

text

```
reason_codes = TOP_3(signal_weight × signal_value)
```

5.2 Code Mapping

Signal Reason Code Human Description

IDN-045	IDN045_HIGH	Login from new country
TXN-155	TXN155_TRIGGER	High transfer velocity
DEV-235	DEV235_POSITIVE	Emulator detected
BIO-310	BIO310_ANOMALY	Unusual typing pattern
HIS-445	HIS445_EXCEEDED	Amount exceeds history

6.0 DECISION BOUNDARIES

6.1 Risk Bands

Score Range Action Auto-hold

1-400 Auto-approve NO

401-650 Review suggested NO

651-800 Review required NO

801-999 Auto-hold YES

6.2 Threshold Changes

Modifying decision boundaries requires:

30-day historical analysis

Impact assessment on false positive rate

Commercial team approval

Model re-calibration

7.0 MODEL TRAINING & VALIDATION

7.1 Training Data Requirements

Minimum samples: 1M transactions

Class balance: Fraud rate 0.5-2.0%

Time period: Last 90 days minimum

Geographic coverage: All operating regions

7.2 Performance Benchmarks

Metric	Minimum	Target
AUC-ROC	0.85	0.92
Precision @ 800+	0.75	0.85
Recall @ 800+	0.65	0.75
False Positive Rate	< 1.0%	< 0.7%

7.3 Validation Process

Back-testing: 30-day out-of-sample

A/B Testing: 5% traffic for 7 days

Shadow Mode: Full traffic for 24 hours

Approval: MRM committee sign-off

8.0 OPERATIONAL CONTROLS

8.1 Model Versioning

Major version: Architecture changes (v1.x → v2.0)

Minor version: Weight/parameter updates (v1.7 → v1.8)

Patch: Bug fixes only

8.2 Rollback Procedure

If performance degrades >10%:

Automatic alert to on-call engineer

Manual verification within 15 minutes

Automatic rollback to previous version

Post-mortem within 24 hours

8.3 Monitoring

Metric Alert Threshold	Response Time
Score distribution shift	KS-test > 0.1
Null input rate > 10%	1 hour
Processing latency > 100ms P95	30 minutes
Feature importance shift	Top 5 change
	4 hours

9.0 CHANGE MANAGEMENT

9.1 Model Retraining

Scheduled: Monthly

Triggered:

Performance drop below benchmarks

Significant data drift detected

New signals added to catalog

Regulatory requirement change

9.2 Approval Workflow

Data Scientist: Propose changes

ML Engineer: Technical review

Risk Ops: Business impact review

Compliance: Regulatory check

MRM Committee: Final approval

Documentation: Update this governance PDF

10.0 APPENDICES

Appendix A: Current Model Weights

Distribution of weights across signal categories (Confidential)

Appendix B: Performance History

Quarterly model performance metrics

Appendix C: Regulatory References

Links to FRB SR 11-7, EU AI Act relevant clauses

APPROVAL SIGNATURES

Chair, Model Risk Management: _____ Date: _____

Chief Risk Officer: _____ Date: _____

Chief Compliance Officer: _____ Date: _____