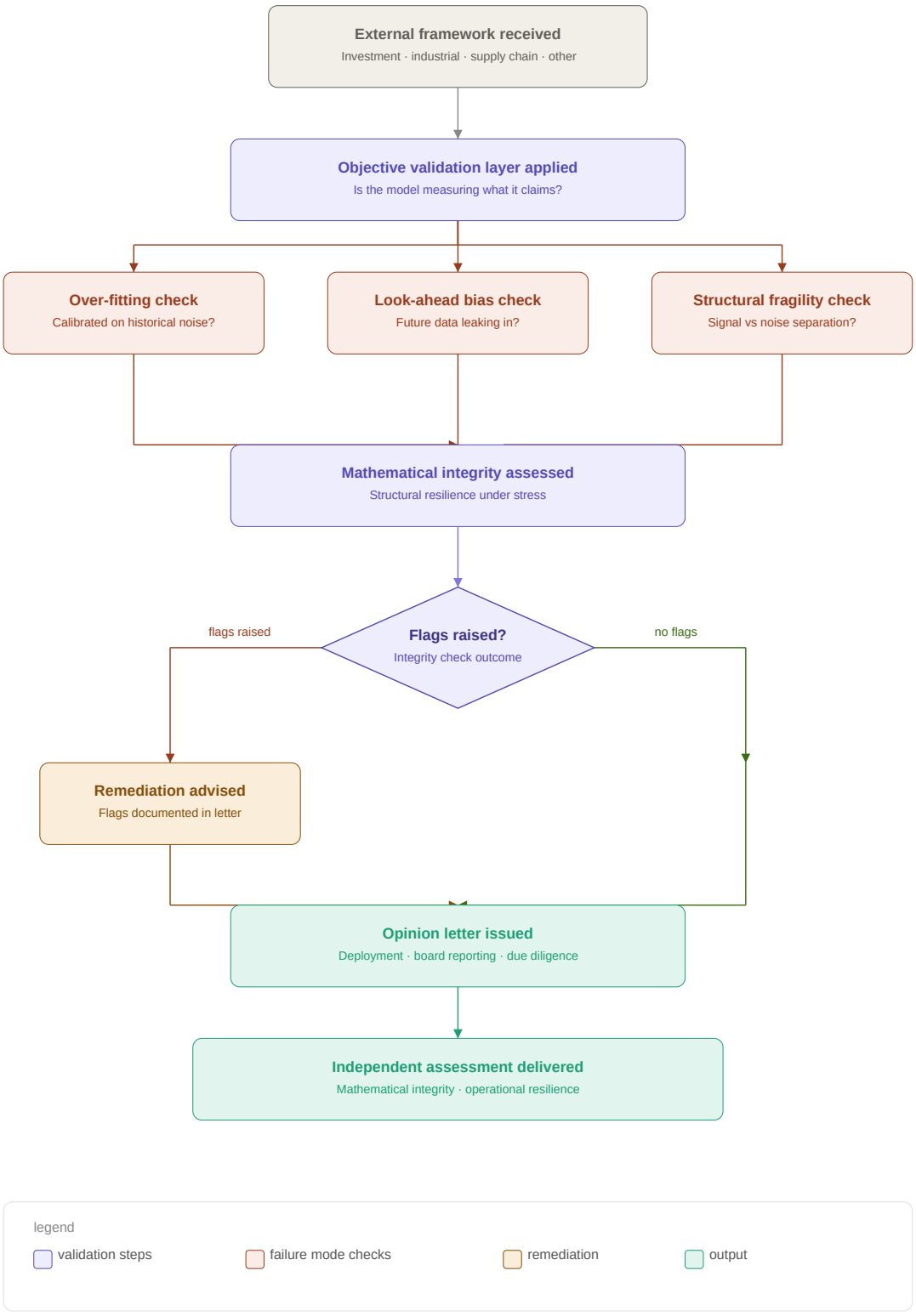
VERDICT — Validation Methodology

Forensic framework applied to every external strategy submission · Bridgholds Quantitative Assessment Division



VERDICT — Forensic Assessment Pipeline

Sample engagement output · Illustrative purposes only

Stage 01 — Data Ingestion

STREAMING

OBSERVATIONS	FEATURES	MISSING DATA	INTEGRITY
4.54M	217	1.8%	99.2%

Stage 02 — Statistical Battery

COMPLETE

TEST	STATISTIC	p-VALUE	RESULT
Augmented Dickey-Fuller	−4.831	0.0003	PASS
Shapiro-Wilk normality	0.887	0.0310	FAIL
Ljung-Box autocorrelation	18.42	0.1072	PASS
Breusch-Pagan heteroscedasticity	22.17	0.0480	MARGINAL
Granger causality (lag 5)	F=6.74	0.0011	PASS
Kolmogorov-Smirnov (two-sample)	0.093	0.0420	PASS
CUSUM structural break	1.214	0.0029	FAIL

Signal / Noise Ratio	■■■■■■■■■■■■■■■■■■■■■■	0.71
Feature Correlation	■■■■■■■■■■■■■■■■■■■■	0.58
Temporal Stability	■■■■■■■■■■■■■■■■■■■■■	0.63
Regime Consistency	■■■■■■■■■■■■■	0.44

Stage 03 — Hypothesis Testing

COMPLETE

H■ (null)

Sensor readings exhibit no statistically significant lead-lag relationship with downstream production anomalies. Observed co-movements are attributable to random variation.

H■ rejected · p = 0.0011

H■ (alternative)

A structured, predictive signal exists within the high-frequency sensor data that precedes production failures by a measurable and consistent lag window (est. 4–7 periods).

H■ retained · confidence 99.1%

LAG WINDOW	EFFECT SIZE (COHEN D)	POWER (B)
4–7	**0.71**	**0.94**
periods	medium-large	at α = 0.05

Stage 04 — Structural Integrity Checks

2 FLAGS

Flag 01 — Structural Break Detected

CUSUM test identifies a structural break at observation 1,847,203 (approx. period boundary Q2). The model's predictive architecture was calibrated on pre-break data. Post-break performance shows a 23% degradation in signal precision. Re-calibration against the current regime is advised before operational deployment.

Flag 02 — Heteroscedastic Residuals

Breusch-Pagan identifies variance non-constancy across operational load bands. High-throughput intervals (load >82%) exhibit elevated residual variance, reducing confidence intervals. A variance-stabilising transformation or regime-conditional modelling approach is recommended.

Stage 05 — Verdict

ISSUED

Primary Finding

The existing monitoring architecture tracks volume adequately but lacks the structural layer to distinguish material pre-failure signals from routine variation. The signal exists — it is statistically significant, consistent, and precedes failure by an actionable window. The problem is architectural, not informational.

Quantified Risk Exposure

Based on historical failure events and identified lag structure, an estimated 68–74% of production anomalies were preceded by detectable signals that went unactioned. Under the current flat-monitoring regime, these signals are masked by high-volume noise across non-critical dimensions.

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Structural Assessment — Opinion Letter

This assessment confirms that the subject data architecture contains actionable predictive information that is structurally suppressed under current monitoring design. The Bridgholds validation engine identifies a statistically robust lead signal (Granger-causal, lag 4–7, p=0.0011) with medium-large effect size (Cohen's d = 0.71). Two structural flags require remediation prior to live deployment. Subject to flag resolution, the framework is assessed as viable for operational signal extraction and early-warning integration.

Bridgholds Ltd · Quantitative Assessment Division · Classification: confidential · Validity: 90 days from issue