

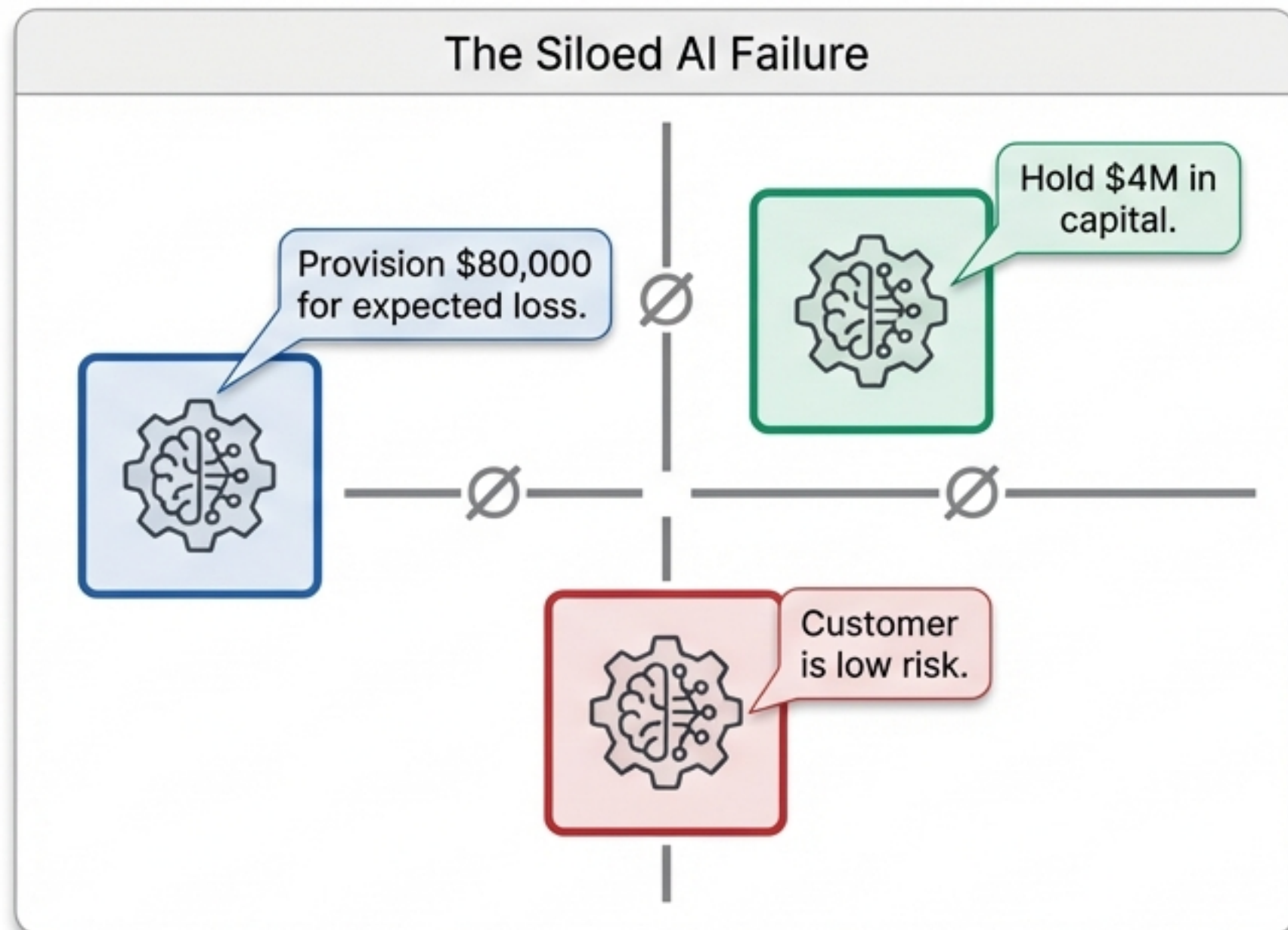
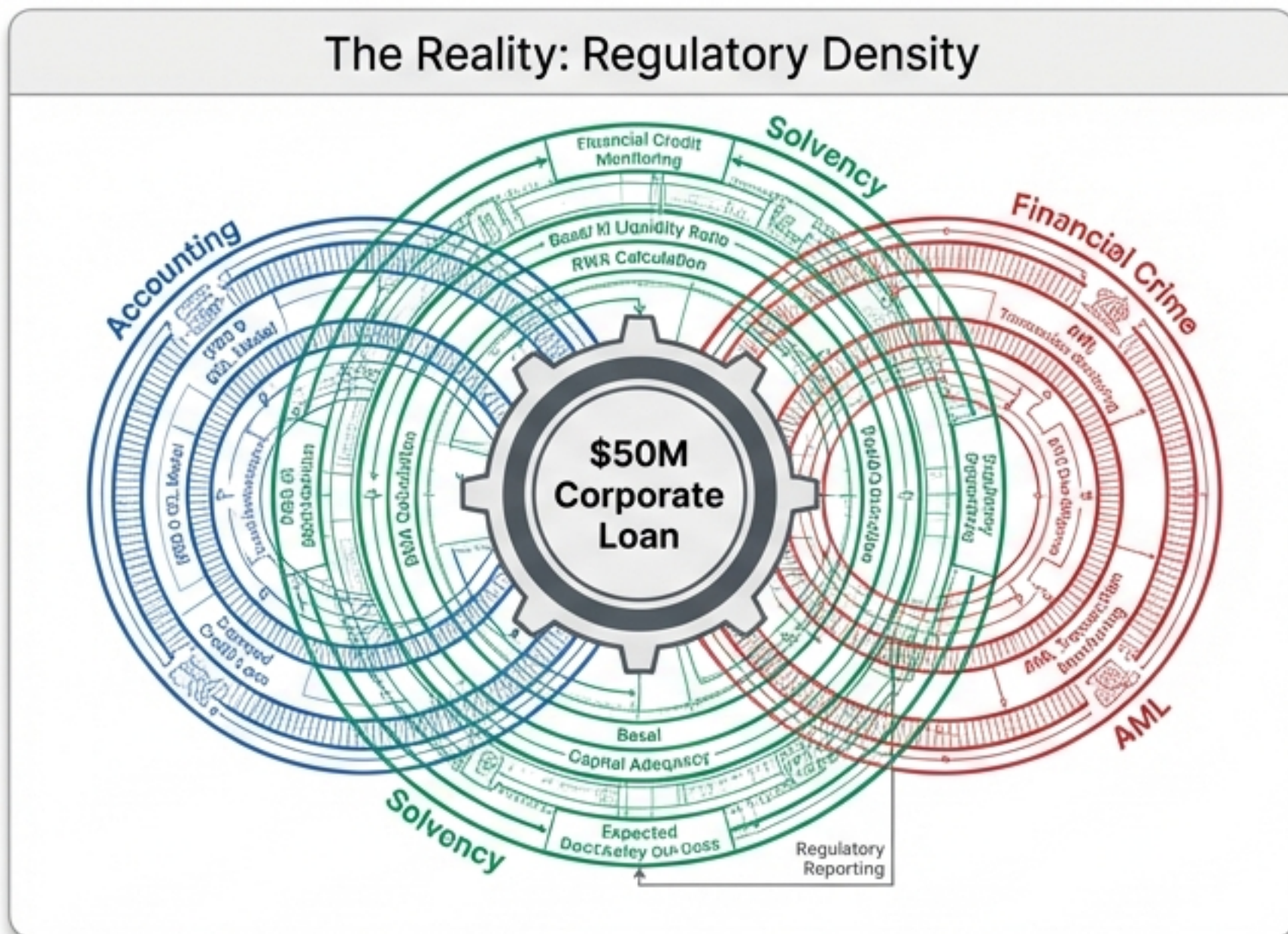
# The Interlocking Engine: AI in Modern Banking Regulation

Designing Pillar-Aware Agent Architectures for IFRS 9, Basel III/IV, and AML Compliance



# The Problem with Siloed Banking AI

Banking is the most regulation-dense industry in the global economy. An AI agent that addresses only one regulatory pillar gives you **exactly** one-third of the answer.



A typical commercial bank processes millions of transactions per day, governed simultaneously by dozens of frameworks. Output without a cross-pillar audit trail is output that cannot be used.

# The Three Pillars of Modern Banking

## Accounting

**Framework**  
IFRS 9

---

**Governing Body**  
IASB (140+ countries)

---

**Question**  
How much should the bank provision for expected credit losses?

---

**Key Metric**  
ECL provision (\$)

## Solvency

**Framework**  
Basel III/IV

---

**Governing Body**  
BCBS at BIS (28 member jurisdictions)

---

**Question**  
Does the bank hold enough capital to absorb unexpected losses?

---

**Key Metric**  
Risk-weighted assets (RWA) and CET1 charge

## Financial Crime

**Framework**  
AML/KYC

---

**Governing Body**  
FATF (200+ jurisdictions)

---

**Question**  
Is the bank being used for money laundering or terrorist financing?

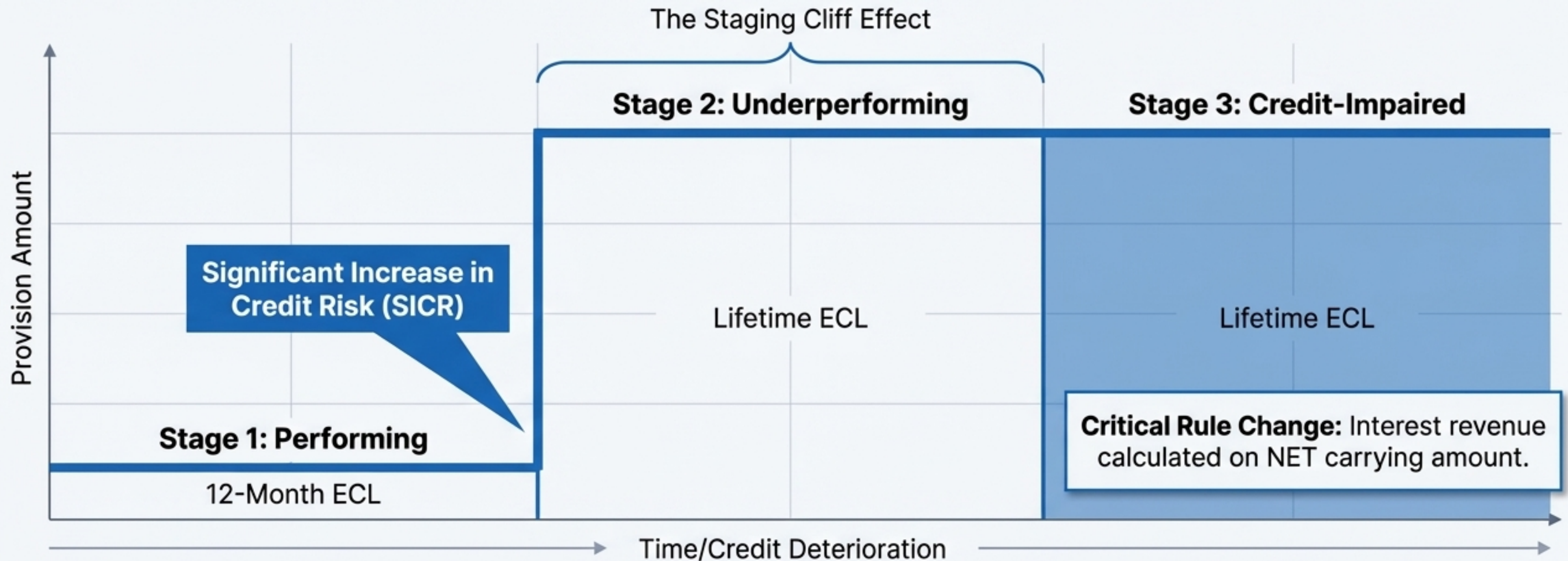
---

**Key Metric**  
Suspicious Activity Report (SAR) / Risk Rating

Every asset on a bank's balance sheet lives in all three columns simultaneously.

# Pillar 1: Accounting (IFRS 9 & The Staging Cliff)

IFRS 9 requires banks to provision for losses **before** they happen. A single rating downgrade can trigger a 5-10x provision explosion.



**Key Insight:** If a borrower's Probability of Default (PD) doubles, SICR is triggered. A \$5,400 provision immediately becomes a \$54,000 provision.

# The ECL Engine & Macroeconomic Overlays

## The Fundamental Formula

$$ECL = PD \times LGD \times EAD$$

Column 1

**PD: Point-in-Time Probability of Default**  
(adjusted by Credit Cycle Adjustment)

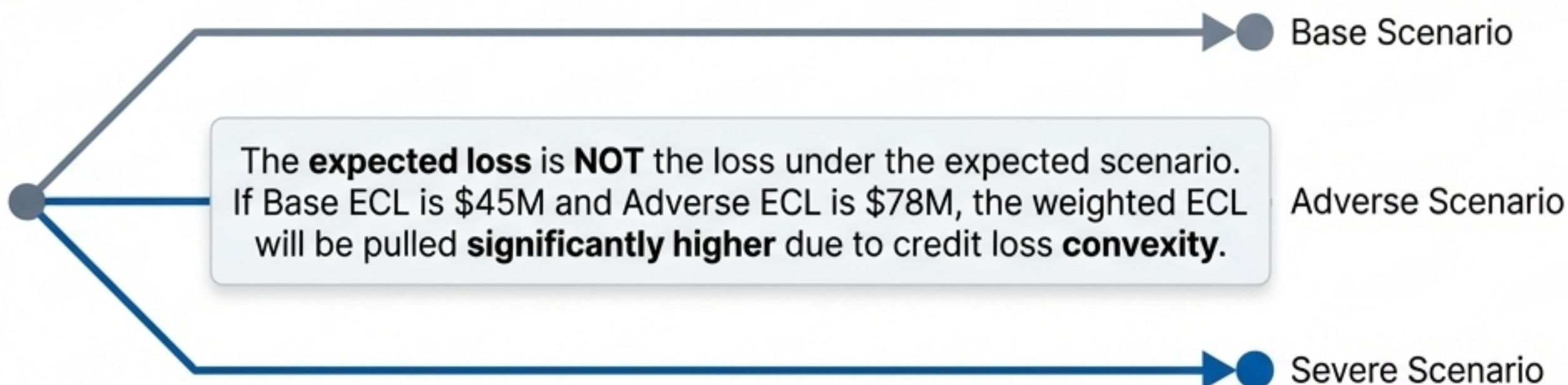
Column 2

**LGD: Downturn Loss Given Default**  
(includes forced sale value haircuts)

Column 3

**EAD: Exposure at Default** (drawn balance + [CCF × undrawn commitment])

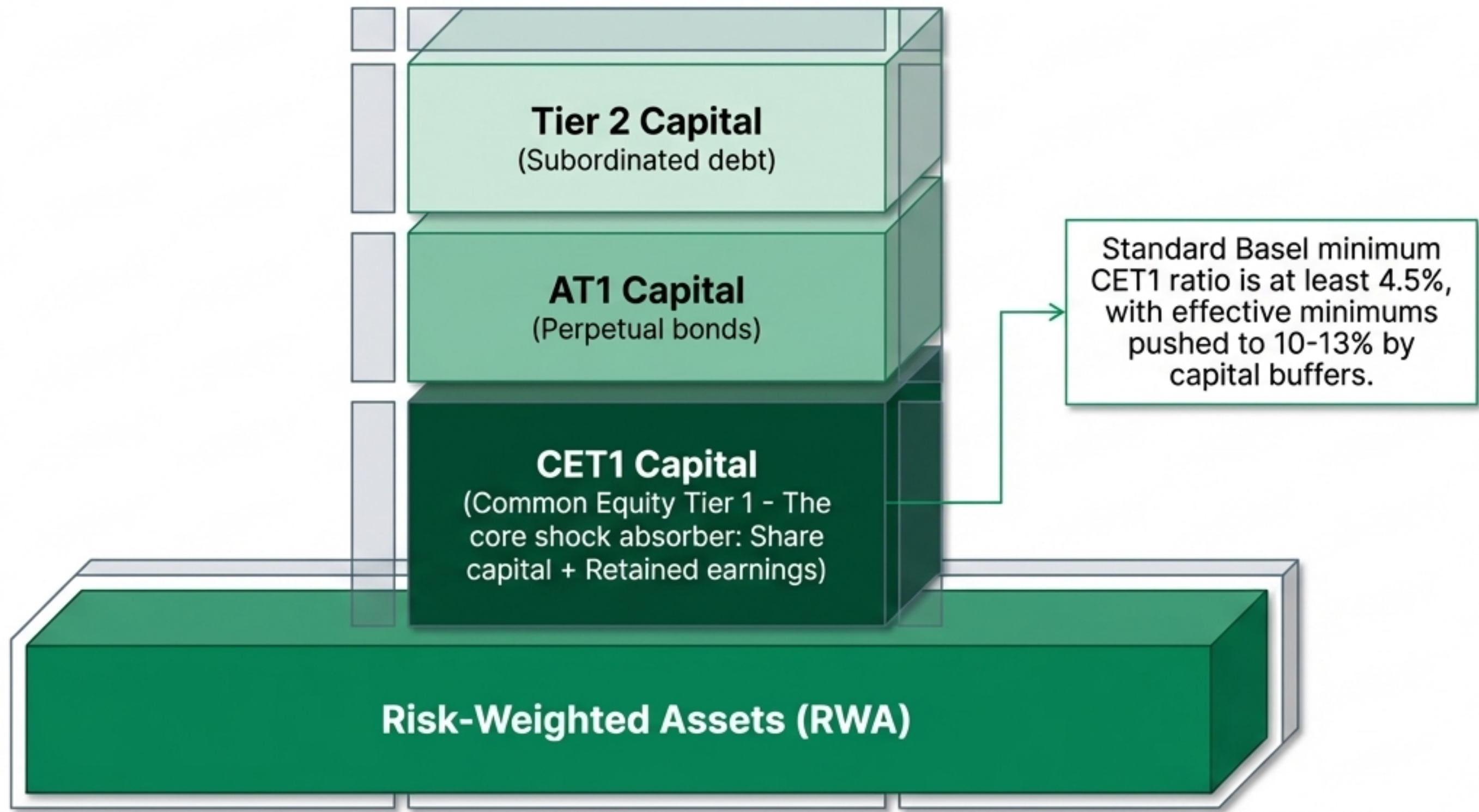
## The Non-Linearity Principle



## Post-Model Adjustments (PMAs)

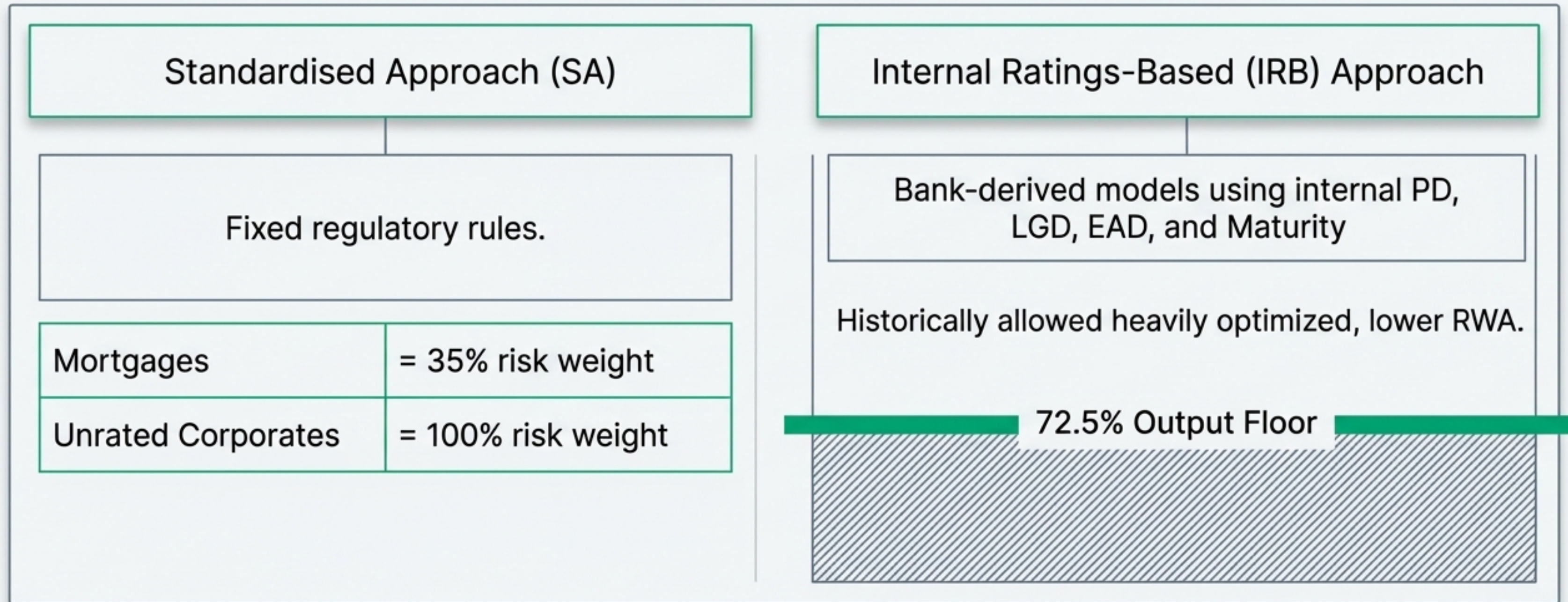
When models cannot capture emerging risks (e.g., sudden geopolitical shocks, pandemics), banks apply **PMAs—management overlays** requiring strict audit governance.

# Pillar 2: Solvency (Basel III/IV & The Capital Stack)



Pillar Interaction Note: IFRS 9 provisions reduce reported profit. Reduced profit lowers retained earnings. Lower retained earnings deplete CET1 Capital.

# Risk-Weighted Assets & The Basel IV Output Floor



IRB banks cannot report RWA below 72.5% of what the Standardised Approach would produce for the same portfolio. This phases in fully by 2030, structurally constraining capital ratio optimization.

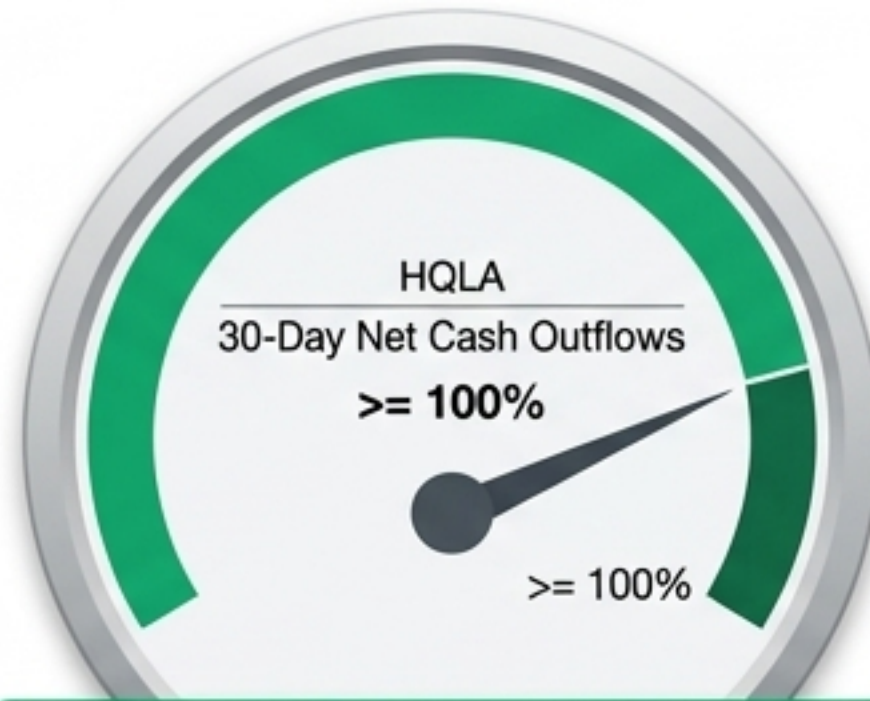
# Beyond Risk Weights: Liquidity & Structural Leverage

## Leverage Ratio



**The non-risk-weighted backstop.** Catches concentration in "low risk" assets that RWA misses.

## LCR (Liquidity Coverage Ratio)



**Short-term survival.** Can the bank survive a 30-day severe stress using only its High-Quality Liquid Assets?

## NSFR (Net Stable Funding Ratio)



**Long-term stability.** Prevents funding 30-year mortgages with 3-month wholesale deposits.

Historical Context: Northern Rock reported a  $>10\%$  Tier 1 ratio in 2006, yet collapsed in 2007 due to absolute leverage and a depleted liquid asset buffer.

# Pillar 3: Financial Crime (The Three Lines of Defence)



Trigger Matrix Box	
When is Enhanced Due Diligence (EDD) required?	
Row 1	Politically Exposed Persons (PEPs) - includes former officials and close associates.
Row 2	High-Risk Jurisdictions (FATF Grey/Black lists).
Row 3	Complex beneficial ownership structures (>25% thresholds).

**Callout:** Failing to execute this framework results in billion-dollar fines (e.g., Goldman Sachs, HSBC, Danske Bank).

# Transaction Monitoring: Rules vs. Machine Learning

## Legacy Rules-Based System

### Methodology

Static thresholds (e.g., >\$9,999 cash deposits trigger "Structuring" alerts).

**95% - 99%**

False Positive Rate

### Human Cost

Crushing "alert fatigue." 300K alerts/year wastes ~100,000 analyst hours.

## Machine Learning (ML) System

### Methodology

Peer group anomaly detection, network analysis (linking shell companies), behavioral autoencoders.

**40% - 60%**

(a 50-70% reduction)

False Positive Rate

### Regulatory Requirement

Demands rigorous model governance, explainability, and back-testing to prevent blind spots.

ML transforms compliance from a brute-force data exercise into precision risk targeting.

# The 'Hard Boundary' of AI in Financial Crime

## ✓ AI Approved / Automated

Document verification (OCR)

PEP/Sanctions database screening

Adverse media scraping

Transaction alert generation

Preliminary SAR narrative drafting



**The Tipping-Off Prohibition:** Under UK POCA 2002 s333A, "tipping-off" a customer that they are under investigation is a criminal offense punishable by up to two years in prison.



## Human Only / Criminal Liability

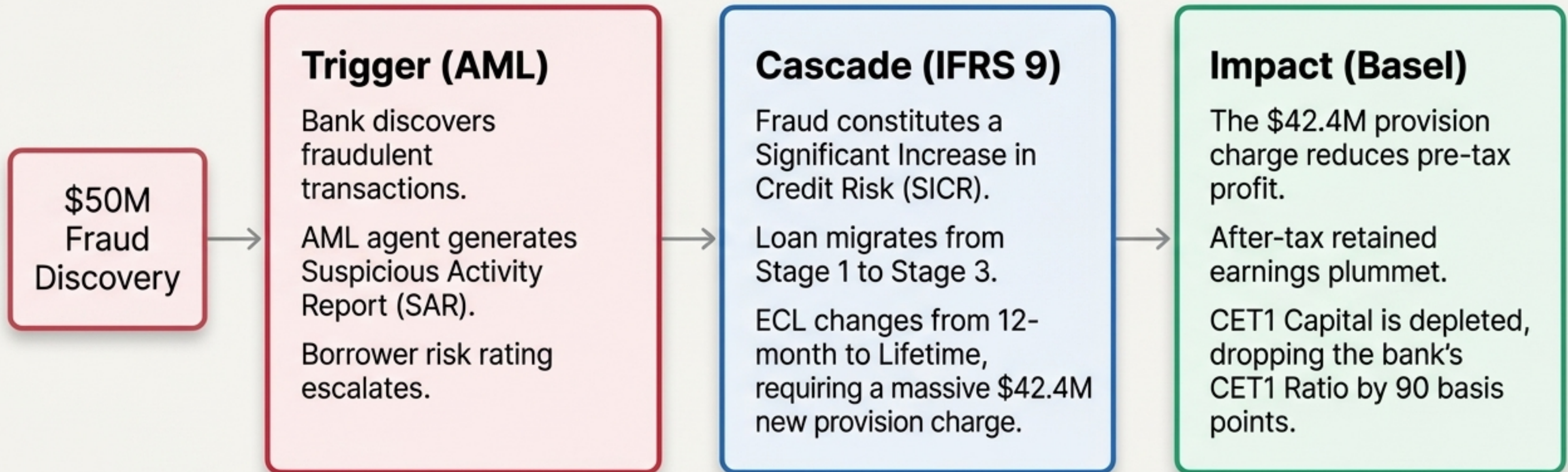
SAR filing decisions

Risk acceptance/rejection

Ultimate beneficial ownership conclusions

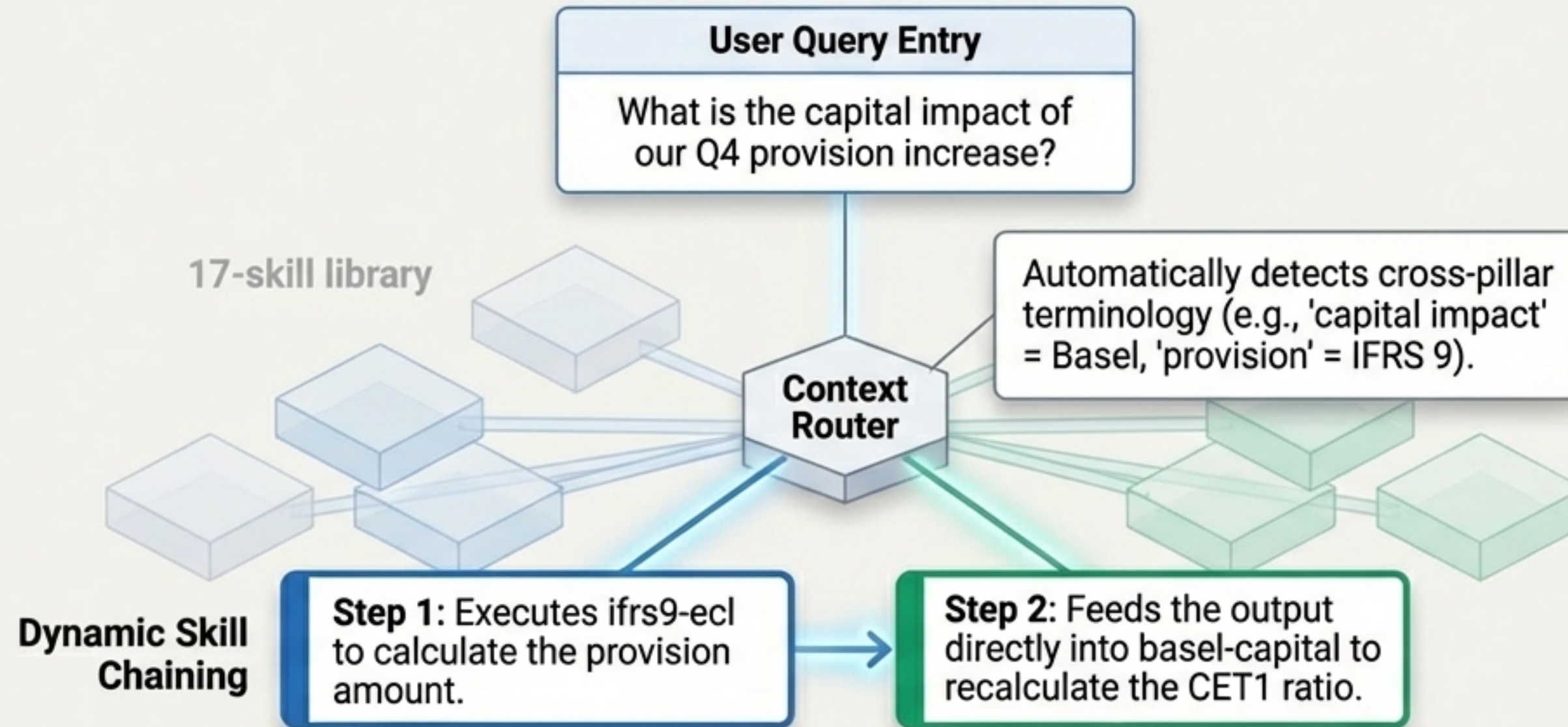
**Design Rule:** An AI agent must NEVER file a SAR autonomously, and must NEVER include investigation status in customer-facing outputs (like chatbot responses).

# SYNTHESIS: The Cross-Pillar Cascade



A siloed agent misses the cascade. An integrated agent **traces the full reaction:** provision up, capital down, regulatory scrutiny triggered.

# The Solution: Pillar-Aware Agent Architecture



**Key Insight:** Separation of concerns: Calculation logic lives in the 17 product skills. Routing and cross-pillar orchestration lives in the global router.

# The Operational Backbone: Bank Reconciliation



## The AI Matching Hierarchy

### Level 1 (Auto-Matching)

AI automatically clears exact, fuzzy, and date-tolerance matches (70-85% of volume).

### Level 2 (Exception Intelligence)

AI proposes hypotheses for breaks (e.g., 'Statement-only item: probable correspondent fee').

### Level 3 (Human Resolution)

Unmatched residuals escalated based on strict ageing SLAs.

**Takeaway:** A bank that cannot reconcile its books cannot trust its regulatory returns. AI automates the matching so humans can investigate the breaks.

# The 5 Principles of Banking AI

1

## Model Governance Applies to AI

AI agents computing ECL or staging are models. They require rigorous validation, back-testing, and approval under frameworks like SR 11-7 / SS1/23.

2

## SICR is Irreducibly Human

AI can flag quantitative DPD thresholds, but assessing a “Significant Increase in Credit Risk” ultimately demands professional judgment.

3

## AML is a Legal Obligation, Not a Data Exercise

Tipping-off is a criminal offense. The agent assists data gathering; humans own the liability of risk acceptance and SAR filing.

4

## The Basel IV Output Floor Reshapes the Industry

IRB banks can no longer fully optimize RWA. Capital calculation requires continuous, accurate monitoring bounded by the 72.5% SA floor.

5

## Pillar Interaction is Where Insight Lives

A bank that isolates ECL, capital, and AML gets three fragmented answers. True regulatory AI traces the multi-pillar cascade to deliver integrated strategic insight.