Q-ARM

The Adaptive Quantum Risk Platform

The Quantum Deadline is a Moving Target

The core problem is "Harvest Now, Decrypt Later." Adversaries are capturing encrypted data today, intending to break it once a fault-tolerant quantum computer is available (Z). We must migrate our critical data before that day arrives.

Mosca's Inequality: The Migration Formula

$$X + Y > Z$$

X = Data Confidentiality Lifetime: How long must this data stay secret?

Y = Migration Time: How long will it take us to become post-quantum safe?

Z = Quantum Threat Horizon: How long until a capable quantum computer exists?

The QARS Model

The Quantum-Adjusted Risk Score (QARS) provides the foundation. It calculates risk as a weighted sum of three key factors.

QARS Formula

$$QARS = (\omega T \cdot T) + (\omega S \cdot S) + (\omega E \cdot E)$$

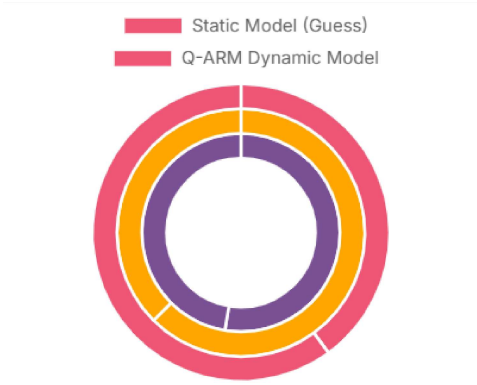
T (Timeline): Urgency based on (X+Y) / Z.

S (Sensitivity): The inherent value of the data.

E (Exposure): The likelihood of the asset being harvested.

Problem: Static Weights are Blind

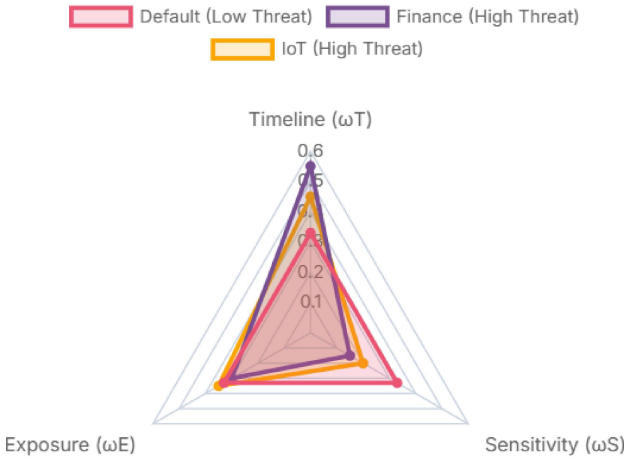
Traditional models use static, subjective weights (e.g., 33% each). This is a guess. Our model uses **Dynamic Weights** that adapt to real-world context, providing a true risk picture.



NOVELTY 1

Dynamic, Threat-Aware Weights

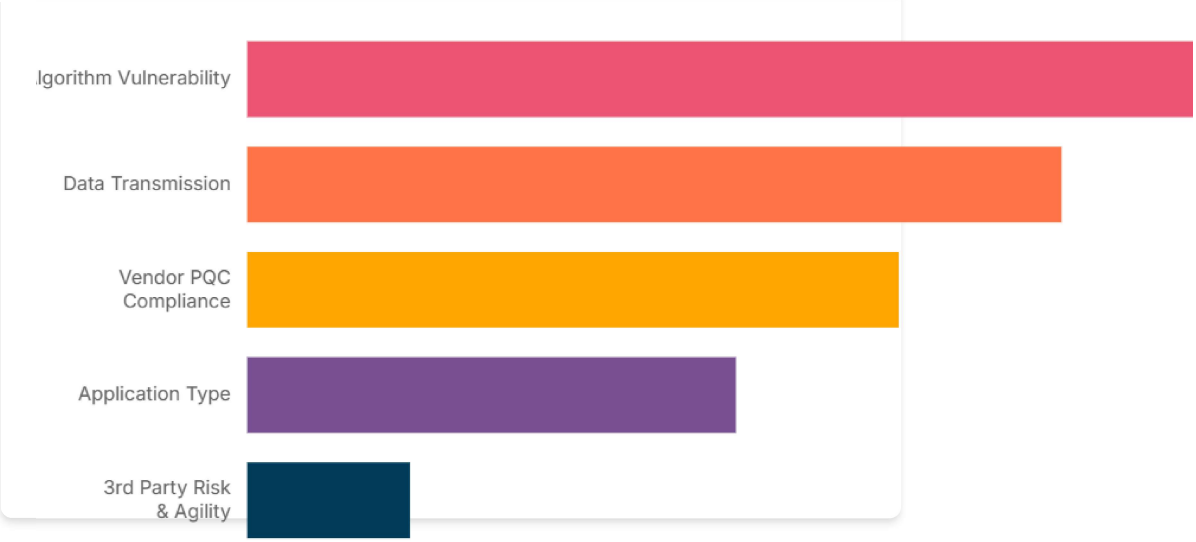
Our weights are not fixed. They shift based on **live threat intelligence** and internal agility. When a sector is under active attack, Timeline (T) and Exposure (E) weights automatically increase.



NOVELTY 2

A Granular Exposure (E) Factor

The "E" (Exposure) factor is no longer a simple guess. Our model calculates it from granular asset attributes. This reveals **precisely where the risk comes from**, allowing for targeted fixes beyond just crypto migration.



The Q-ARM Architecture: From Data to Decision

This is our complete, operational pipeline. It moves from private data generation to dynamic risk scoring, culminating in an adaptive, self-improving classifier.

STAGE 1: Data Acquisition

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CTGAN Synthetic Data
Generate a privacy-safe, statistically identical dataset for training.

↓

Parameter Inference
Cleanse and map raw inventory to QARS parameters (X, Y, Z, q).

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STAGE 2: QARS Calculation

External Threat Feed
Ingest real-time sector-specific threat severity scores.

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Dynamic Weight Engine
Calculate adaptive weights (ωT, ωS, ωE) based on threat and agility.

QARS Scoring
Generate final score and category (Low, Medium, High, Critical).

STAGE 3: Adaptive Classification

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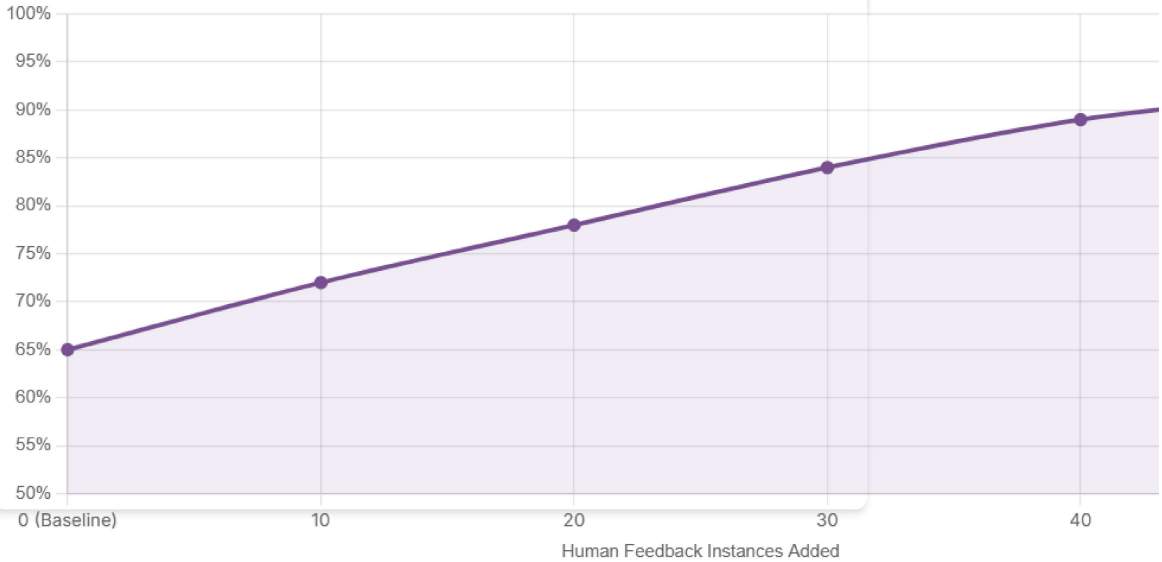
DP/HITL Adaptive Loop

Loop:

1. Train Baseline DP Classifier on Scored Data.
2. A new asset is scored.
3. **Human Expert provides feedback** (True Label).
4. Adaptive Model updates via **`partial_fit`**.
5. Add Gaussian Noise (DP Protection).
6. Model is now smarter. Repeat.

NOVELTY 3 Adaptive DP Classifier (HITL)

Risk models become stale. Our platform uses a **Human-in-the-Loop (HITL)** system. As your experts provide feedback on new assets, the model uses `partial_fit` to learn incrementally. It gets smarter over time, protected by Differential Privacy.



The ROI of Accuracy

This isn't just a better model—it's a cheaper, faster, and safer migration strategy.

~30%

Reduced Migration Waste

95%+

Prioritization Accuracy

Q-ARM: Adaptive Quantum Risk Platform | An Infographic