

THE SMART CUSTODY VAULT

Mr Rajkumar S

Founder, MD & CEO

Sequel Logistics Private Limited



Integrating IoT, AI Telematics, and Decentralized Ledgers for Fault-Tolerant, High-Volume Bullion Transit

Every bar of gold that leaves a refiner's gate carries an unspoken question: can anyone prove where it is, who has touched it, and that nothing about it has changed until it reaches its destination? For India's bullion vaulting and logistics industry, that question is no longer answered by physical security alone; it is increasingly a matter of information architecture.

Three key technologies are now converging to answer this question—not just for a single vault or shipment, but across an entire operational network.

CHAIN OF CUSTODY

Three layers, one record.

Sensors, scoring and settlement combine into a single tamper-evident account of every bullion movement.



IoT Sensors

Tamper, seal and GPS readings from the vault and the armoured vehicle.



AI Telematics

Live signals scored against route history into one risk index.



Decentralized Ledger

Each verified event written once, in sequence, and never rewritten.



IoT Makes the Network Legible

Across a multi-hub network spanning several states, a consignment today carries far more than a simple seal and signature. Tamper-evident sensors continuously log jolts and unauthorized access attempts inside vaults or vehicles. GPS tracking and geofencing turn every truck into a live data point rather than a black box between origin and destination.

For the receiving bank, exchange, or jeweller, this real-time visibility enables faster verification upon arrival alongside tighter monitoring during transit. In an industry where a five-minute unexplained stop can trigger significant client anxiety, real-time network-wide visibility is rapidly becoming the core service product.

AI Telematics Turns Sensor Noise into Foresight

Data is only as useful as the intelligence layer interpreting it. The industry is shifting from reactive alerts—such as notifying dispatch when a vehicle stops unexpectedly—to predictive risk scoring.

Machine learning models flag unusual route deviations before they turn into incidents, optimize hub and route allocations across expanding networks, and identify which movement patterns precede potential problems. This proactive approach establishes operational fault tolerance: no single point of failure—whether a driver, a route, or a vault node—should halt a high-volume network. AI-driven telematics integrate redundancy directly into decision-making, automatically escalating alerts once risk thresholds are crossed, long before a human operator would notice.

Decentralised Ledgers Separate Custody from Ownership

India's Electronic Gold Receipt (EGR) framework, along with similar exchange-backed global models, provides a practical execution model. Under these structures, KYC and ownership verification remain with the exchange, while physical custody resides with an appointed vault manager.

This separation operates effectively at scale only if every movement, weighment, and assay result is recorded on a shared, tamper-evident ledger that all participating parties and regulators can independently audit. Decentralization allows distinct organizations to trust a unified record without relying on each other's internal IT systems. As tokenized gold and blockchain-backed settlements gain global momentum, shared, immutable custody records are becoming the industry standard rather than an exception.

Fault Tolerance as the Core Design Principle

The unifying thread across these technologies is network-wide fault tolerance, extending beyond individual vaults or vehicles. A smart custody model assumes systemic failures will occur and builds resilience across every operational layer:

Redundant Connectivity: Ensures signal interruptions do not cause a loss of visibility.

Automated Escalation Pathways: Designed so anomalies reach authorized personnel within minutes rather than hours.

Distributed Ledger Architecture: Guarantees that an outage at a single node never breaks the chain of custody.

None of this replaces the fundamentals of secure logistics: vetted personnel, armoured transit, and adequately insured custody. Technology does not substitute for trust; it continuously verifies it at a scale manual processes could never achieve. As India's bullion trade expands in volume and complexity, continuous, verifiable proof of custody will distinguish compliant operators from genuinely secure market leaders.

