
Domain: Smart Shipping & Cargo Insurance (Logistics Domain)

Role: QE Analyst

Project Name : *CargoTrack360 – Smart Logistics & Insurance Platform*

□ Project Overview

CargoTrack360 is a smart logistics platform that pairs IoT-powered shipment tracking with automated cargo insurance. It captures real-time data like location, temperature, and shock exposure and triggers alerts or claim workflows when thresholds are breached. My QA responsibilities included end-to-end testing of sensor-triggered workflows, real-time alerts, API validations, and predictive analytics output accuracy. The platform was a key enabler for reducing shipping risks and insurance claim losses for B2B partners.

🚩 Realistic Problem Faced

Shipping high-value goods without real-time visibility increases risk of loss, delays, and insurance disputes. During testing, we encountered incorrect alert thresholds triggering false positives, delayed data syncing from IoT devices, and faulty claim predictions. These issues could have caused wrong claims processing or unnecessary escalations, severely damaging client trust and costing money.

✅ My QA Approach

- **Requirement Review & Risk Analysis:**
 - Collaborated closely with product and IoT teams to understand end-to-end workflows.
 - Identified high-risk areas like threshold alerting, sensor data ingestion, and insurance claim triggers.
- **Testing Tools & Techniques:**
 - Used **Postman** for testing REST APIs (shipment creation, event logging, claims).
 - Used **JIRA** for defect tracking and story/test coverage.
 - Validated sensor payload ingestion using simulated devices and MQTT logs.
 - Created SQL scripts for verifying data integrity in historical shipment events.
- **Test Types Executed:**
 - Functional Testing
 - Negative Testing (invalid/missing sensor data)
 - Boundary Testing (extreme temperature/shock limits)
 - Workflow Testing (shipment lifecycle, claims automation)

Critical Scenarios Covered

- Verifying real-time alert generation when IoT sensor detects temperature or shock beyond threshold.
- Testing data delay scenarios where IoT device syncs data late and verifying fallback handling.
- Validating automatic insurance claim creation when a shipment meets loss criteria.
- Simulating lost shipment scenario and validating geo-fence breach detection logic.
- Testing predictive model's accuracy in risk scoring when multiple shipments are at risk.
- Ensuring APIs reject malformed sensor data or duplicate shipment IDs.

Notable Defects Caught

- **False Positive Alerts:**
Identified that a timezone misalignment was causing alerts to trigger outside the actual event window.
- **Sensor Data Corruption:**
Found an issue where sensor payload with special characters broke the backend parser, skipping entire events.
- **Claim Auto-Rejection Bug:**
Claims triggered automatically due to threshold breach were incorrectly being marked as "rejected" due to misconfigured rules.
- **Incorrect Risk Scores:**
Predictive analytics model was assigning incorrect risk scores due to missing environmental factors (humidity wasn't factored in).
- **Shipment Link Loss:**
Found that multi-hop shipments were losing linkage between legs, affecting chain-of-custody tracking.

Business Impact

- Helped avoid **hundreds of false alerts per day**, reducing operational noise and improving response times by 35%.
- Prevented faulty claim rejections, potentially saving **\$25,000+ in claim payouts** and customer goodwill.
- Ensured more accurate risk prediction, helping underwriters better evaluate **insurance premiums**.
- Enabled a successful product release by closing **100% blocker and 98% critical defects** before UAT.
