**Project Proposal**

**Anti-Fraud Transaction Monitoring System (AF-TMS)**  
*For New Zealand Financial Institutions*

**Executive Summary**

Financial fraud and money laundering continue to rise in New Zealand, costing millions annually and placing increasing pressure on banks and financial service providers to comply with Anti-Money Laundering and Countering Financing of Terrorism (AML/CFT) obligations. Existing monitoring systems are often reactive, generic, or poorly aligned with New Zealand’s regulatory landscape, resulting in inefficiencies, high false positives, and increased compliance costs.

The **Anti-Fraud Transaction Monitoring System (AF-TMS)** proposes a **real-time, scalable platform** that ingests and analyzes financial transactions, flags suspicious activities, and supports compliance teams with advanced investigative and reporting tools. By combining customizable rule-based detection with explainable machine learning models, AF-TMS reduces manual workload, accelerates fraud detection, and strengthens regulatory compliance.

**Problem Statement**

* **Rising Financial Crime**: In 2024, fraud and scam-related losses in New Zealand exceeded *NZD $200 million* (CERT NZ, 2024).
* **Compliance Burden**: Financial institutions face increasing scrutiny under New Zealand’s AML/CFT Act, with costly penalties for non-compliance.
* **Limitations of Current Tools**: Many existing systems are imported and not tailored for local regulations, lack explainability in AI/ML outputs, and require significant manual intervention.

**Proposed Solution**

The AF-TMS platform will deliver a **New Zealand-focused fraud detection and compliance system** with:

* **Customizable Detection Logic**: Local institutions can easily adapt rules for emerging fraud trends and regulatory changes.
* **Explainable AI Models**: Machine learning modules highlight *why* a transaction is flagged, improving trust and compliance defensibility.
* **Seamless Integration**: Connects with existing banking core systems or synthetic datasets for testing and demonstration.
* **Compliance-First Design**: Automated suspicious activity reporting (SARs), audit trails, and reporting aligned with DIA and Reserve Bank requirements.

**Core Features**

**Data Ingestion**

* Secure integration with core banking APIs or synthetic test data generators.

**Rule-Based Detection Engine**

* Configurable rules (e.g., large rapid transfers, international wire anomalies, geolocation mismatches).

**Machine Learning Detection**

* Anomaly detection using models such as isolation forests and clustering.
* Explainable outputs to ensure transparency for compliance officers.

**Alerting & Case Management**

* Real-time dashboard alerts.
* Case assignment, annotation, and resolution tracking.
* Full audit trail for regulatory review.

**Data Visualization**

* Transaction network graphs to uncover hidden money flow patterns.
* Heatmaps by region, time, and channel.

**Compliance & Reporting**

* Exportable Suspicious Activity Reports (SARs).
* Detailed logs aligned with NZ AML/CFT reporting standards.

**Security**

* End-to-end encryption (TLS + AES).
* Role-based access controls (RBAC) and audit logs.

**Technology Stack**

* **Frontend**: React + TypeScript (D3.js for interactive visualizations).
* **Backend**: Node.js (Express/Fastify) with Socket.IO for live updates.
* **Database**: PostgreSQL (transaction/case storage), Redis (real-time messaging).
* **Machine Learning Module**: TensorFlow.js or Python microservice.
* **Authentication & Security**: JWT/OAuth2, RBAC.
* **Deployment**: Docker, Kubernetes-ready, cloud compatible.
* **Testing & CI/CD**: Jest, Cypress, GitHub Actions.

**Project Timeline & Milestones (16 Weeks)**

| **Phase** | **Duration** | **Deliverable** |
| --- | --- | --- |
| Requirements & Research | 2 weeks | Stakeholder feedback, regulatory mapping |
| Architecture & Data Integration | 2 weeks | Ingestion pipeline & database schema |
| Rule Engine & ML Prototype | 4 weeks | Configurable rules + anomaly detection demo |
| Frontend & Visualization | 3 weeks | Interactive dashboard with transaction graphs |
| Case Management & Reporting | 2 weeks | Investigator workflows + SAR exports |
| Security, Testing & Demo | 3 weeks | Secure deployment + pilot demonstration |

**Impact & Benefits**

* **Regulatory Compliance**: Reduces risk of penalties by automating AML/CFT reporting.
* **Operational Efficiency**: Cuts down manual case reviews by leveraging automation and visualization.
* **Faster Response**: Real-time monitoring allows instant intervention on high-risk activities.
* **Cost Savings**: Reduces false positives, improving compliance team productivity.
* **Future-Proofing**: Modular design allows integration of advanced AI models and cross-organization intelligence sharing.