SDG BLOCKCHAIN ACCELERATOR

Prototype (PoC) Report – Template

1. Project Information

- **Project Name:** RELOOP
- **Challenge & UNDP Office:** UNDP GEORGIA
- **Document Version:** V.1

2. Project Overview

The goal of the prototype is to build and test a basic but functional version of a blockchain-based rewards system that encourages proper e-waste disposal. It focuses on allowing residents to locate certified drop-off points, scan a QR code at the site, and submit photographic evidence of their e-waste deposit.
Reloop Eco Drop is a digital recycling incentive platform designed to promote circular waste management by rewarding users for responsible recycling behavior.
The prototype integrates QR-coded waste bins, a web-based user interface, and a blockchain-backed reward ledger that enables transparent tracking of recycling transactions.

Core Features:

- User registration and QR code scanning via web app.
- Submission of waste items (plastic, glass, metal) with points assigned per item type.
- Real-time dashboard for viewing earned tokens and recycling history.
- Admin panel for verifying transactions and managing drop-off locations.
- Transparent data layer enabling traceability of waste collection and token issuance.

This PoC demonstrates how a blockchain-powered reward system can incentivize sustainable behavior, increase recycling rates, and enable transparent data reporting for SDG 12 (Responsible Consumption and Production) and SDG 13 (Climate Action).

3. Repository Structure

The project repository is available at:

🔗 *GitHub – Reloop Eco Drop*

Main Directory Layout:

/reloop-eco-drop

```
/src
  /components     -> UI components for dashboard, forms, QR scanner
  /pages          -> App routes for Home, Admin, and Drop-off modules
  /utils          -> API and database utilities
/public
  /assets         -> Static resources and icons
/server
  /api            -> API endpoints for transaction submission and retrieval
/docs             -> README, architecture diagrams, and usage guides
```

4. Build Instructions

The prototype is built with **Next.js** and **Node.js**.

Steps to Build:

```
# Clone repository
git clone https://github.com/kootie/reloop-eco-drop.git
cd reloop-eco-drop

# Install dependencies
npm install

# Start development server
npm run dev
```

Environment Variables Required:

```
DATABASE_URL=<Supabase or PostgreSQL connection string>
NEXT_PUBLIC_API_URL=<Local or production API endpoint>
```

Build for Production:

```
npm run build
npm start
```

5. Test Instructions

Unit Tests

Run basic lint and type checks:

```
npm run lint
```

- Use Jest or Cypress (when configured) for testing UI behavior and form validation.

Integration Tests

- Validate end-to-end user flow:
    1. Register new user → Submit recyclable item → Earn tokens → View updated dashboard.
    2. Admin verifies submission and updates total recycled waste count.

Expected Output

- Successful form submission returns `200 OK` and transaction ID.
- Dashboard updates points dynamically after submission confirmation.

Edge Cases

- Invalid QR codes rejected with error message.
- Duplicate submissions prevented via unique transaction hash.

6. Deployment Instructions

The live prototype is deployed on **Vercel** at
🔗 https://reloop-eco-drop.vercel.app

To redeploy manually:

```
# Build static files
npm run build

# Deploy via Vercel CLI
vercel --prod
```

Backend Deployment:

- Hosted via serverless API routes on Vercel.
- Database connection handled through Supabase or hosted PostgreSQL.

7. Testnet / Emulator Results

While this prototype focuses on the web app functionality, blockchain integration was simulated via transaction logging for traceability.
In future iterations, reward issuance can be extended to a Cardano testnet using lightweight token minting scripts.

Transaction ID	Action	Status	Notes
TX001	Item scanned: Plastic Bottle	Success	Token points added to user account
TX002	Duplicate submission	Rejected	Validation check successful

TX003	Admin verification	Success	Dashboard updated

8. Dependencies & Environment

- Framework: Next.js 14.0
- Language: TypeScript
- Database: PostgreSQL (via Supabase)
- Hosting: Vercel
- Libraries Used:
    - axios – API communication
    - react-qr-reader – QR scanning
    - react-icons – UI components
    - supabase-js – Database connection
    - chart.js – Dashboard visualizations

9. Demo / Walkthrough

Live Demo:
🔗 Reloop Eco Drop – Web App

Demo Flow:

1. User scans QR code to identify recycling point.
2. Enters type and quantity of recyclable items.
3. Points added automatically and reflected on user dashboard.
4. Admin reviews submissions for verification.

10. Remaining Issues / Next Steps

- *Integrate blockchain token issuance for real transaction traceability on Cardano.*
- *Implement mobile-friendly camera interface for improved QR scanning.*
- *Strengthen authentication with wallet-based login (e.g., Lace or Eternl).*
- *Add analytics dashboard for waste volume and SDG impact visualization.*
- *Conduct user testing with local pilot schools or recycling partners.*