CircularSync - Complete Team Documentation

Circular Economy Waste Management Platform

Show Image



CircularSync transforms Sri Lankan industrial waste into valuable resources through an intelligent marketplace platform. We're building the future of sustainable business where waste becomes wealth.

🥊 The Problem We're Solving

- 70% of industrial waste goes to landfills in Sri Lanka
- Businesses lose money disposing of potentially valuable materials
- No organized marketplace exists for industrial waste trading
- Environmental damage from unnecessary waste accumulation

Our Solution

- **Digital Marketplace:** Connect waste suppliers with buyers
- Quality Assurance: Professional field verification by trained agents
- Fair Pricing: Al-powered auction system with secure payments
- Complete Ecosystem: Chat, notifications, payments, and logistics all in one platform

© Business Model

Traditional: Waste → Landfill → Environmental Damage X

CircularSync: Waste → Resource → Profit → Environmental Benefit ✓

Revenue Streams:

- Transaction fees from successful sales
- Premium subscriptions for advanced features
- Verification service charges

User Ecosystem & Roles

Platform Hierarchy

SUPER ADMIN (Platform Owner) Complete system control Add/remove Admins Revenue and analytics oversight		
ADMIN (Operations Manager) L—— Add/remove Field Agents L—— Monitor all transactions L—— Resolve disputes and issues		
FIELD AGENTS (Quality Inspectors) On-site material verification Photo documentation and assessment Inventory management and approval		
SUPPLIERS (Waste Providers) ├──		
BUYERS (Material Purchasers) Companies seeking raw materials Auction participation and bidding Material procurement and delivery		

Detailed Role Responsibilities

Role	Primary Tasks	Key Features	Success Metrics
Super Admin	Platform governance, admin management, revenue monitoring	Analytics dashboard, user management, system configuration	Platform growth, revenue targets, user satisfaction
Admin	Daily operations, agent coordination, dispute resolution	Transaction monitoring, agent assignment, customer support	Resolution time, agent performance, customer satisfaction
Field Agent	Quality verification, site visits, material approval	Mobile app, photo capture, GPS tracking, offline capability	Verification accuracy, response time, customer ratings
Individual	Small-scale waste registration,	Easy registration, earnings	Listing frequency, sale
Supplier	pickup coordination	tracking, notification alerts	conversion, earnings growth
Organization	Bulk waste management,	Advanced dashboard, bulk	Volume efficiency, cost
Supplier	multi-location operations	tools, analytics reports	savings, sustainability metrics
Buyer	Material sourcing, auction bidding, procurement	Search filters, bidding tools, delivery management	Purchase frequency, cost savings, material quality satisfaction
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E Complete Technology Architecture

Technology Stack

Component	Technology	Purpose	Benefits	
Frontend	Next.js 14 + Tailwind CSS	User interface & PWA	Fast, responsive, mobile- optimized	
Notifications	react-hot-toast	In-app toast alerts	Lightweight, customizable notifications	
Backend	Ballerina Swan Lake	API services & business logic	Cloud-native, secure, scalable	
Database	PostgreSQL (Choreo)	Data storage & management	Reliable, ACID compliant, managed	
Authentication	Asgardio	Identity & access management	Enterprise security, SSO ready	
Payments	Choreo Payment + Multi- Wallet	Transaction processing & wallet management	Secure, compliant, feature-rich	
Deployment	Choreo Platform	Cloud hosting & scaling	Auto-scaling, monitoring, maintenance	
PWA	Next.js PWA	Mobile app experience	Offline capability, push notifications	

Progressive Web App (PWA) Features

- Offline Functionality: Field agents can work without internet
- Push Notifications: Real-time alerts even when app is closed
- **Home Screen Install:** App-like experience on mobile devices
- Fast Loading: Optimized for slow network connections
- Background Sync: Automatic data synchronization when online

Complete Feature Set

End-to-End Material Workflow

1. La Supplier registers waste material with photos and details 2. Al system performs initial quality pre-screening 3. Field agent assigned based on location and expertise Agent visits site for hands-on quality assessment 5. Photo documentation and quality scoring (1-10 scale) 6. Agent approves/rejects material for marketplace 7. Paper Approved materials automatically enter auction system 8. A Relevant buyers receive intelligent match notifications 9. Seal-time bidding with automatic wallet fund freezing 10. **Z** Auction ends → Winner's payment held in secure escrow 11. 🚚 Delivery coordination between buyer and supplier 12. Delivery confirmation releases payment to supplier 13. Platform commission automatically deducted 14. 📊 Transaction history and ratings updated for all parties

AI-Powered Intelligence

Smart Material Matching:

- Analyze buyer purchase history and preferences
- Match materials with relevant buyers automatically
- Send targeted notifications to increase conversion rates
- Consider location, quantity, and quality requirements

Dynamic Pricing Optimization:

- Historical price analysis for similar materials
- Market demand forecasting for optimal timing

- Starting price recommendations for auctions
- Bidding strategy suggestions for buyers

Logistics Intelligence:

- Route optimization for field agents
- Pickup/delivery cost calculations
- Appointment scheduling based on availability
- Weather and traffic considerations

Advanced Auction System

Intelligent Bidding Features:

- Auto-Bid: Set maximum price and let system bid automatically
- **Bid Increments:** Smart minimum increment suggestions
- Last-Minute Extensions: Prevent auction sniping with time extensions
- Bulk Bidding: Bid on multiple similar materials simultaneously
- **Bid History:** Complete transparency of all bidding activity

Auction Types:

- Standard Auction: Traditional highest bidder wins
- Buy It Now: Instant purchase at fixed price
- Reserve Auction: Minimum price protection for suppliers
- Dutch Auction: Price decreases until buyer accepts

i Comprehensive Wallet & Payment System

Multi-Wallet Architecture:

- Buyer Wallet: Pre-loaded funds for instant auction bidding
- Supplier Wallet: Earnings accumulation and withdrawal management
- **Escrow Wallet:** Secure temporary holding during transactions
- Admin Wallet: Platform commissions and operational funds

Payment Method Integration:

- **Credit/debit** cards, bank transfers, mobile wallets
- Cash on Delivery (COD): Traditional payment with photo verification

- **Wallet Transfers:** Instant platform-internal transactions
- **Bank Integration:** Direct account linking for easy funding

Advanced Payment Features:

- Auto-Freeze System: Bid amounts temporarily secured during auctions
- Smart Escrow: Automatic payment holding until delivery confirmation
- Instant Refunds: Automatic refunds for unsuccessful bids
- Payment Scheduling: Delayed payments for large transactions
- Multi-Currency: Support for USD, EUR for international transactions

Transaction Security:

- End-to-End Encryption: All payment data protected
- Fraud Detection: Al-powered suspicious activity monitoring
- Dispute Resolution: Dedicated system for payment issues
- Audit Trail: Complete transaction history for compliance

Integrated Communication Hub

Real-Time Chat System:

- **ـــ...** Supplier ↔ 🧘 Agent Communication:
 - Pre-Visit Planning: Coordinate site access and material preparation
 - Live Quality Discussion: Real-time clarification during assessment
- Photo Sharing: High-resolution material images and documentation
- Specification Clarification: Technical requirements and standards
- Appointment Scheduling: Flexible timing coordination
- Language Support: Sinhala, Tamil, English with auto-translation
- Buyer ↔ Lange Supplier Negotiation:
- Requirement Discussion: Detailed material specifications
- Quantity Negotiations: Bulk purchase arrangements
- **Delivery Coordination:** Logistics and timing arrangements
- Quality Concerns: Post-purchase issue resolution
- Future Partnerships: Long-term supply agreements

• **Contract Sharing:** Document exchange and digital signatures

Advanced Chat Features:

- **File Attachments:** Photos, PDFs, specifications, contracts
- **Voice Messages:** Quick audio communication
- **P** Location Sharing: GPS coordinates for pickup/delivery
- **Message Search:** Find conversations and shared files instantly
- **Message Flagging:** Mark important discussions
- Conversation Archives: Organized chat history
- **Encryption:** End-to-end security for sensitive discussions

Intelligent Notification System

Multi-Channel Delivery:

- In-App Notifications: Real-time browser alerts with badge counters
- **Email Alerts:** Detailed summaries and critical updates
- **III SMS Notifications:** Urgent alerts for time-sensitive actions
- Push Notifications: Mobile app alerts even when offline
- WhatsApp Integration: Business communication (popular in Sri Lanka)

Smart Notification Logic:

- **@ Targeted Alerts:** Role-specific relevant notifications only
- Intelligent Batching: Group related notifications to reduce noise
- **Quiet Hours:** Respect user time zones and preferences
- **Priority Levels:** Critical, High, Medium, Low with different delivery methods
- Frequency Control: Prevent notification spam with smart limits

Notification Categories by Role:

Super Admin Alerts:

- Platform performance and system health
- Revenue milestones and financial summaries
- Security incidents and suspicious activities
- User growth metrics and engagement reports

Admin Notifications:

- New supplier registrations requiring approval
- Agent performance reports and issues
- Customer disputes requiring resolution
- Payment processing problems and refunds

Field Agent Updates:

- New verification assignments with GPS locations
- Urgent quality check requests from suppliers
- Payment confirmations for completed work
- Route optimization and weather alerts

Supplier Communications:

- Material verification status updates (approved/rejected)
- Auction start notifications for their materials
- Bid received alerts with bidder information
- Payment processing and earnings confirmations
- Agent appointment confirmations and changes

Buyer Alerts:

- New material availability matching their preferences
- Auction ending reminders (24h, 1h, 15min warnings)
- Outbid notifications during active auctions
- Winning bid confirmations and payment instructions
- Delivery scheduling and tracking updates

Design System & User Experience

MongoDB Atlas Inspired Dual Theme

Professional Theme System:

- Stight Mode: Clean, bright interface for office environments
- Jark Mode: Reduced eye strain for mobile field work

- Smart Toggle: Automatic system preference detection
- User Preference: Persistent theme selection storage

Role-Based Visual Identity:

- **Admin Theme:** MongoDB Green for system control and management
- Agent Theme: Professional Blue for field verification work
- Supplier Theme: Emerald Green for material provision
- Buyer Theme: Purple for procurement and purchasing

Status Color Coding:

- Pending: Yellow awaiting action or review
- **Verified/Active:** Green approved and ready for action
- Rejected/Failed: Red issues requiring attention
- In Auction: Purple with pulse animation live bidding
- **Completed:** Blue successful transactions

Mobile-First Design Principles

- Touch Optimization: Large buttons and swipe gestures
- One-Hand Navigation: Important actions within thumb reach
- Fast Loading: Optimized images and progressive loading
- Offline Indicators: Clear feedback for connection status
- Responsive Layout: Seamless experience across all devices

Business Impact & Success Metrics

🔭 Environmental Benefits

- Waste Reduction: Target 70% reduction in industrial waste to landfills
- Carbon Footprint: Lower transportation emissions through local matching
- Resource Conservation: Extend material lifecycle through reuse
- Sustainability Reporting: Help businesses meet green targets

Economic Impact

• New Revenue: Suppliers earn 15-30% additional income from waste

- Cost Savings: Buyers save 20-40% on raw material costs
- Job Creation: Field agent employment and skill development
- Market Efficiency: Transparent pricing through competitive auctions

Platform Performance Metrics

User Growth Targets:

- Month 1-3: 100 suppliers, 50 buyers, 10 agents
- Month 4-6: 500 suppliers, 200 buyers, 30 agents
- Month 7-12: 2000 suppliers, 800 buyers, 100 agents

Transaction Volume Goals:

- Monthly Transactions: Target 1000+ successful material sales
- Platform Revenue: 5% commission on successful transactions
- User Retention: 80% monthly active user retention rate
- Quality Metrics: 95% material verification accuracy

Business Intelligence Tracking:

- Material Categories: Most traded waste types and trends
- Geographic Patterns: Regional supply and demand analysis
- Pricing Analytics: Market price trends and optimization
- **User Behavior:** Engagement patterns and feature usage

🚀 Implementation Roadmap

Phase 1: Foundation (Weeks 1-4)

Core Platform Development

- ✓ User authentication and role-based access control
- Material registration and basic listing functionality
- Admin dashboard for user and system management
- Z Database design and core API endpoints
- Z Basic responsive UI with theme system

Week 1-2: Authentication & User Management

- Asgardio integration for secure login
- User role assignment and permissions
- Admin panel for user management
- Profile management functionality

Week 3-4: Material Management

- Material registration forms and validation
- Photo upload and basic quality checks
- Admin approval workflow
- Material listing and search functionality

Phase 2: Core Features (Weeks 5-9)

Advanced Marketplace Functionality

- Field agent verification workflow and mobile optimization
- Auction system with real-time bidding
- Z Payment integration and wallet management
- Basic notification system
- Z PWA implementation for mobile users

Week 5-6: Field Agent System

- Agent assignment and workflow management
- Mobile-optimized verification interface
- GPS integration and location tracking
- Photo capture and quality assessment tools

Week 7-8: Auction & Payment System

- Real-time bidding engine with WebSocket
- Wallet system with freeze/unfreeze functionality
- Choreo payment service integration
- Escrow and automatic payment processing

Week 9: PWA & Mobile Optimization

Progressive Web App configuration

- Offline functionality for field agents
- Push notification setup
- Mobile performance optimization

Phase 3: Communication & Intelligence (Weeks 10-13)

Advanced Features & AI Integration

- Real-time chat system between users
- Advanced notification system with multiple channels
- Al-powered matching and recommendations
- Advanced analytics and reporting
- Multi-language support

Week 10-11: Communication Hub

- Real-time chat implementation
- File sharing and voice message support
- Multi-language translation features
- Advanced notification system with preferences

Week 12-13: AI & Analytics

- Machine learning recommendation engine
- Demand prediction and pricing optimization
- Advanced analytics dashboard
- Business intelligence reporting

Phase 4: Polish & Launch (Weeks 14-16)

Production Readiness

- Comprehensive testing and quality assurance
- Performance optimization and security audit
- User training materials and documentation
- Soft launch with pilot users
- Marketing preparation and launch strategy

Week 14: Testing & QA

- Comprehensive user testing across all roles
- Performance optimization and bug fixes
- Security audit and penetration testing
- Load testing for auction system

Week 15: Documentation & Training

- User manuals and training materials
- Admin and agent training programs
- API documentation for future integrations
- Video tutorials and help content

Week 16: Launch Preparation

- Pilot user onboarding and feedback
- Marketing material preparation
- Launch event planning
- Post-launch support planning

🔒 Security & Compliance Framework

Data Protection Standards

- Encryption: End-to-end encryption for all sensitive data
- Access Control: Role-based permissions with principle of least privilege
- Audit Logs: Complete activity tracking for compliance
- Data Backup: Automated daily backups with disaster recovery
- GDPR Compliance: European data protection standards

Financial Security

- PCI DSS Compliance: Credit card data protection standards
- Bank-Level Security: Multi-factor authentication for payments
- Fraud Detection: Al-powered suspicious transaction monitoring
- Escrow Protection: Secure fund holding during transactions
- Regular Audits: Quarterly security assessments

Business Compliance

- Local Regulations: Sri Lankan business and tax compliance
- Environmental Standards: Waste management regulation adherence
- International Trade: Documentation for cross-border transactions
- **Quality Standards:** ISO certification preparation
- Legal Framework: Contract management and dispute resolution

11 Team Structure & Responsibilities

Development Team

Frontend Developer (2 people)

- User interface development with Next.js and Tailwind
- PWA implementation and mobile optimization
- Component library and design system maintenance
- Performance optimization and user experience

Backend Developer (2 people)

- API development with Ballerina
- Database design and optimization
- Authentication and security implementation
- Third-party service integration (payments, notifications)

Mobile/PWA Specialist (1 person)

- Progressive Web App optimization
- Offline functionality development
- Push notification implementation
- Mobile-specific feature development

DevOps Engineer (1 person)

- Choreo platform deployment and management
- CI/CD pipeline setup and maintenance
- Monitoring and alerting configuration
- Performance optimization and scaling

@ Product Team

Product Manager (1 person)

- Feature requirements and user story definition
- Stakeholder communication and alignment
- Roadmap planning and priority management
- User feedback collection and analysis

UI/UX Designer (1 person)

- User interface design and prototyping
- User experience research and testing
- Design system maintenance
- Accessibility and usability optimization

Business Analyst (1 person)

- Market research and competitive analysis
- Business requirement gathering
- Success metrics definition and tracking
- User acceptance testing coordination

Business Team

Quality Assurance (2 people)

- Comprehensive testing across all features
- User acceptance testing coordination
- Bug tracking and resolution management
- Performance and security testing

Marketing Manager (1 person)

- User acquisition strategy and execution
- Content creation and brand management
- Partnership development
- Launch planning and event management

Customer Success (1 person)

- User onboarding and training
- Customer support and issue resolution
- User feedback collection and analysis
- Community building and engagement

📊 Operations Team

Field Operations Manager (1 person)

- Field agent recruitment and training
- Quality control and performance monitoring
- Regional expansion planning
- Operational process optimization

Finance Manager (1 person)

- Revenue tracking and financial reporting
- Payment processing and reconciliation
- Budget management and cost optimization
- Compliance and audit coordination

📞 Communication & Project Management

Meeting Schedule

- **Daily Standups:** 9:00 AM 15 minutes (Development Team)
- Weekly Sprint Planning: Monday 10:00 AM 2 hours (All Teams)
- Bi-weekly Product Reviews: Friday 2:00 PM 1 hour (Product Team)
- Monthly All-Hands: First Friday 4:00 PM 1 hour (Entire Team)

🛠 Tools & Platforms

- Project Management: Jira for task tracking and sprint management
- **Communication:** Slack for daily communication and coordination
- Documentation: Confluence for knowledge sharing and documentation
- Code Repository: GitHub for version control and code reviews
- Design: Figma for UI/UX design and prototyping

Reporting Structure

- Development Team \rightarrow Technical Lead \rightarrow CTO
- Product Team \rightarrow Product Manager \rightarrow CPO
- Business Team → Business Manager → CEO
- Operations Team \rightarrow Operations Manager \rightarrow COO

6 Immediate Action Items

This Week (Week 1)

Technical Setup:
 Set up development environments for all team members Create GitHub repository with initial project structure Configure Asgardio tenant for authentication Set up Choreo platform accounts and database
Team Coordination:
 Finalize team member assignments and responsibilities Set up project management tools (Jira, Slack, Confluence) Schedule regular meeting cadence Create communication channels and document sharing
Business Planning:
 Conduct market research and competitor analysis Define target user personas and use cases Create detailed user stories and acceptance criteria Plan pilot user recruitment strategy
Next Steps (Weeks 2-4)
Development:
Complete authentication system with AsgardioImplement core user roles and permissions

Design:

Design and create database schema

■ Build admin dashboard for user management

Create complete design system and component library
Design all user interfaces for different roles
 Develop PWA specifications and mobile optimization
Create brand guidelines and visual identity
Business:
Finalize pricing strategy and revenue model
 Develop user onboarding and training materials
Create legal framework and terms of service
☐ Plan launch strategy and marketing approach

o Success Factors & Risk Management

Critical Success Factors

1. **User Adoption:** Achieve target user registration goals

2. **Quality Assurance:** Maintain high material verification standards

3. Platform Reliability: Ensure 99.9% uptime and fast performance

4. Payment Security: Zero payment fraud and secure transactions

5. **User Experience:** Intuitive interface with minimal learning curve

Risk Assessment & Mitigation

Technical Risks:

• Risk: Scalability issues during peak auction times

Mitigation: Load testing and auto-scaling configuration

Business Risks:

Risk: Low user adoption in target markets

Mitigation: Pilot program with incentives and referral system

Financial Risks:

• **Risk:** Payment processing failures or fraud

Mitigation: Multiple payment providers and fraud detection

Operational Risks:

• Risk: Field agent quality control issues

Mitigation: Comprehensive training and performance monitoring

Key Performance Indicators (KPIs)

Technical KPIs:

• Platform uptime: >99.9%

Page load time: <2 seconds

Mobile performance score: >90

API response time: <500ms

Business KPIs:

• Monthly active users: Growth target 20%

Transaction success rate: >95%

User satisfaction score: >4.5/5

Revenue growth: Monthly target 15%

Additional Resources

Documentation Links

• Technical Documentation: GitHub Wiki

• API Documentation: Postman Collection

Design System: <u>Figma Design Library</u>

User Manuals: <u>Help Center</u>

확 Training Resources

• Technology Training: Next.js, Ballerina, Choreo platform tutorials

• Domain Knowledge: Circular economy principles and waste management

• Business Training: Marketplace business models and user acquisition

Compliance Training: Data protection and financial regulations

🤝 External Partners

Asgardio: Authentication and identity management

Choreo: Cloud platform and payment services

• Local Waste Management: Industry partnerships and expertise

• Environmental Organizations: Sustainability certification and promotion

Document Version: Final 1.0

Last Updated: August 2025

Team Size: 15 members

Project Duration: 16 weeks to launch

is Target Revenue: \$100K ARR by end of Year 1

This document serves as the complete reference for all team members working on CircularSync. Regular updates will be made as the project evolves.

Let's build the future of circular economy together!