Software Requirements Specification

for

WASRUK

Version 1.0 approved

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Revision History

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| **Name** | **Date** | **Reason For Changes** | **Version** |
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# Introduction

## Purpose

WasRuk collects the segregated waste from the households and that segregated waste is again segregated into multiple categories and directly sold to the recycling industry and to the biogas plant while we make profit from that waste and try to return some of part of the revenue to each household so that they stay motivated to help us in the cause.

## Document Conventions

Font: Arial, size 12

Highlighting: Bold text signifies section headings, and italicized text signifies emphasis.

Priority: Each requirement statement will have its own priority indicated.

## Intended Audience and Reading Suggestions

Intended Audience: Developers, project managers, marketing staff, users, testers, and documentation writers.

## Project Scope

Description: The software aims to revolutionize waste management in India by incentivizing waste segregation at the source. It includes a mobile application and web platform where users can segregate their waste into various categories and earn rewards for their contributions. The software will facilitate the collection, recycling, and monetization of segregated waste, ultimately reducing the burden on landfills and promoting environmental sustainability.

## References

Indian Agro & Recycled Paper Mills Association. "Waste Management Statistics Report." Version 1.0. January 2024.

Government of India. "National Waste Management Policy." Version 2.0. December 2023.

# Overall Description

## Product Perspective

The waste management software specified in this SRS is a new, self-contained product aimed at addressing the challenges of waste management in India. It is not a replacement for existing systems but rather a novel solution to improve waste segregation and recycling practices. The software will interface with existing waste collection systems and recycling facilities, providing a platform for users to participate in waste segregation at the source. A diagram illustrating the major components of the overall system, including interfaces with external stakeholders such as waste collection agencies and recycling facilities, will be provided in the detailed design documentation.

## Product Features

The software offers the following major features:

Waste segregation at the source: Users can segregate their waste into various categories such as plastic, paper, e-waste, and organic waste.

Incentivization mechanism: Users receive rewards such as gift vouchers, coupons, and cashback for proper waste segregation.

Collection and recycling: The software facilitates the collection and recycling of segregated waste materials to produce market-ready products.

User engagement: Users can track their contributions, earn virtual rewards (Wcoins), and participate in family ranking systems based on their waste segregation efforts.

## User Classes and Characteristics

The anticipated user classes for this product include:

General Public: Individuals and households who generate waste and participate in waste segregation.

Waste Collection Agencies: Organizations responsible for collecting segregated waste from households and transporting it to recycling facilities.

Recycling Facilities: Entities involved in the recycling process, including sorting, processing, and manufacturing recycled products.

Government Authorities: Regulatory bodies and policymakers responsible for overseeing waste management initiatives and enforcing regulations.

Users may vary in their frequency of use, technical expertise, and level of engagement with the software. While all user classes are important to satisfy, special emphasis will be placed on engaging the general public to maximize participation in waste segregation efforts.

## Operating Environment

The software will operate in the following environment:

Hardware Platform: Compatible with desktop computers, laptops, tablets, and smartphones.

Operating System: Compatible with Windows, macOS, Linux, iOS, and Android.

Software Components: Compatible with modern web browsers such as Chrome, Firefox, Safari, and Edge.

## Design and Implementation Constraints

The following constraints will influence the design and implementation of the software:

Regulatory Policies: Compliance with waste management regulations and environmental standards.

Hardware Limitations: Consideration of device capabilities, such as processing power and memory.

Interfaces to Other Applications: Integration with existing waste collection systems and recycling facilities.

Security Considerations: Implementation of robust security measures to protect user data and transactions.

Design Conventions: Adherence to design principles and programming standards to ensure maintainability and scalability.

## User Documentation

The following user documentation components will be delivered along with the software:

User Manuals: Comprehensive guides on using the software and participating in waste segregation efforts.

Online Help: Interactive help features integrated within the software interface.

Tutorials: Step-by-step tutorials to assist users in getting started with the software.

Delivery formats and standards for user documentation will be based on industry best practices and user preferences, ensuring accessibility and ease of use.

## Assumptions and Dependencies

Assumptions:

User Adoption: It is assumed that users will readily adopt the waste management software and participate in waste segregation efforts to earn rewards. The success of the project depends on widespread user engagement.

Regulatory Compliance: The software assumes compliance with existing waste management regulations and environmental standards. Any changes in regulations may impact the functionality and requirements of the software.

Availability of Resources: The project assumes the availability of necessary resources, including funding, technology infrastructure, and personnel, for successful development and implementation.

Stakeholder Cooperation: The project assumes cooperation and support from stakeholders, including government agencies, waste collection agencies, and recycling facilities, to ensure seamless integration and operation of the software.

Dependencies:

Third-party Components: The project relies on certain third-party or commercial components for functionality, such as payment gateways for reward distribution and mapping APIs for location-based services.

Development Environment: The project is dependent on the availability and compatibility of development tools, frameworks, and libraries required for software development.

Data Sources: The project depends on access to accurate and up-to-date data sources, including waste management statistics, user information, and reward distribution mechanisms.

External Systems: The project may have dependencies on external systems, such as waste collection systems and recycling facilities, for data exchange and integration purposes.

# System Features

## System Feature 1: Waste Segregation at Source

Description and Priority:

This feature enables users to segregate their waste into various categories, such as plastic, paper, e-waste, and organic waste. Priority: High.

Stimulus/Response Sequences:

User selects the type of waste to be disposed of.

System prompts user to deposit waste in the corresponding bin.

User confirms deposit, and system records the contribution.

Functional Requirements:

REQ-1: The system shall provide options for users to select the type of waste they are disposing of.

REQ-2: The system shall display instructions guiding users on proper waste disposal practices.

REQ-3: The system shall record user contributions and update user profiles accordingly.

REQ-4: The system shall generate rewards for users based on their contributions to waste segregation efforts.

## System Feature 2: Reward Distribution

Description and Priority:

This feature involves the distribution of rewards to users based on their contributions to waste segregation efforts. Priority: High.

Stimulus/Response Sequences:

User accumulates points or rewards through waste segregation activities.

System calculates rewards based on predefined criteria.

System notifies users of their rewards through the app or website.

Users can redeem rewards for various incentives, such as gift vouchers or cashback.

Functional Requirements:

REQ-1: The system shall track user contributions and calculate rewards accordingly.

REQ-2: The system shall notify users of their rewards through push notifications or email.

REQ-3: The system shall provide options for users to redeem rewards through the app or website.

REQ-4: The system shall maintain a record of redeemed rewards and update user profiles accordingly.

# External Interface Requirements

## User Interfaces

Logical Characteristics:

The user interface shall follow modern design principles and be intuitive to use.

Sample screen images and layouts will be provided in the user interface specification document.

Standard buttons and functions, such as help and logout, will be available on every screen.

Error messages shall be displayed in a clear and user-friendly manner.

## Hardware Interfaces

Logical and Physical Characteristics:

The software shall be compatible with desktop computers, laptops, tablets, and smartphones.

Supported device types include Windows, macOS, Linux, iOS, and Android.

The software shall communicate with hardware components via standard communication protocols.

## Software Interfaces

Connections to Other Software Components:

The software shall interface with third-party components for reward distribution and mapping APIs for location-based services.

Data exchange with external systems, such as waste collection systems and recycling facilities, will be facilitated through APIs.

## Communications Interfaces

Communication Requirements:

The software shall support communication functions such as push notifications, email, and web browser interactions.

Communication standards such as HTTP will be used for data transfer.

Communication security measures, including encryption, will be implemented to protect user data and transactions.

# Other Nonfunctional Requirements

## Performance Requirements

Response Time: The software shall respond to user interactions within 2 seconds under normal load conditions to ensure a seamless user experience.

Scalability: The system shall be capable of handling a minimum of 10,000 concurrent users without significant degradation in performance.

Data Processing Speed: The software shall process and update user contributions and rewards in real-time to provide up-to-date information to users.

Availability: The software shall have an uptime of at least 99.9% to ensure uninterrupted access for users.

## Safety Requirements

Data Security: The software shall implement robust security measures to protect user data from unauthorized access, manipulation, or theft.

User Privacy: The software shall adhere to privacy regulations and standards to safeguard user information and maintain user confidentiality.

Error Handling: The software shall handle errors and exceptions gracefully to prevent system crashes and data corruption.

## Security Requirements

User Authentication: The software shall implement secure user authentication mechanisms, such as two-factor authentication, to verify user identities and prevent unauthorized access.

Data Encryption: All sensitive data transmitted over the network shall be encrypted using industry-standard encryption algorithms to prevent eavesdropping and data interception.

Access Control: The software shall enforce role-based access control to restrict access to sensitive functionality and data based on user roles and permissions.

## Software Quality Attributes

Usability: The software shall be intuitive and easy to use, with clear navigation and user-friendly interfaces.

Maintainability: The software shall be designed and implemented using modular and well-documented code to facilitate future maintenance and updates.

Reliability: The software shall be reliable and robust, with minimal downtime and low error rates.

Portability: The software shall be compatible with a wide range of devices and operating systems to ensure accessibility for users.

# Other Requirements

Database Requirements: The software shall utilize a relational database management system (RDBMS) for data storage and retrieval, with support for ACID properties and scalability.

Internationalization Requirements: The software shall support multiple languages and localization features to accommodate users from diverse linguistic backgrounds.

Legal Requirements: The software shall comply with all relevant laws, regulations, and industry standards governing waste management, data privacy, and consumer protection.

Reuse Objectives: The software components shall be designed and implemented with reusability in mind to facilitate future development and extension of the system.

Appendix A: Glossary

Wcoins: Virtual rewards earned by users for participating in waste segregation activities.

API: Application Programming Interface, a set of rules and protocols for building and interacting with software applications.

ACID Properties: Atomicity, Consistency, Isolation, Durability; a set of properties that ensure database transactions are processed reliably.

Appendix B: Analysis Models

The following analysis models provide a visual representation of key aspects of the software system:

Data Flow Diagram (DFD):

This diagram illustrates the flow of data within the waste management software system, including inputs, processes, and outputs.

It shows how waste is segregated at the source, collected, recycled, and rewarded.

Class Diagram:

The class diagram depicts the various classes and their relationships within the software system.

It represents the data structures and relationships between different entities such as users, rewards, waste categories, and transactions.

State-Transition Diagram:

This diagram represents the different states and transitions of the waste management system.

It depicts the lifecycle of a waste segregation transaction, including states such as pending, processed, and rewarded.

Entity-Relationship Diagram (ERD):

The ERD illustrates the relationships between different entities in the system, such as users, rewards, and transactions.

It shows how these entities are connected and how they interact with each other.

Appendix C: Issues List

The following issues are open and require resolution:

TBD Requirements: Several requirements are marked as TBD (To Be Determined) and need further clarification or specification.

Pending Decisions: There are pending decisions related to the choice of technology stack, reward distribution mechanisms, and user interface design.

Information Needed: Additional information is required on waste management regulations, data sources, and third-party integrations.

Conflicts Awaiting Resolution: There are conflicts between certain requirements or design decisions that need to be addressed and resolved.

Implementation Challenges: Anticipated challenges in the implementation phase, such as scalability issues and data synchronization, need to be discussed and mitigated.

This issues list will be updated and maintained throughout the project lifecycle to ensure that all requirements are addressed and resolved in a timely manner.