REPLASTIXINNOVATIONS:TRANSFORMING PLASTIC WASTE INTO SUSTAINABLE SOLUTIONS

Abstract

RePlastix Innovations: Transforming Plastic Waste into Sustainable Solutions is an innovative Salesforce-based CRM project designed to address the growing challenges of plastic waste management. As environmental concerns escalate and sustainable practices become critical, this project aims to digitize and streamline the operations of plastic collection, recycling, product tracking, and customer service through a comprehensive cloud-based solution.

Built entirely on the Salesforce platform, RePlastix Innovations leverages the power of custom objects, process automation, Apex triggers, and declarative tools such as validation rules and flows to manage end-to-end operations. The system tracks plastic waste collected from different locations, manages recycling centers' capacity, maintains real-time stock levels of recycled products, handles customer orders efficiently, and auto-generates restock requests when inventory falls below threshold levels.

One of the primary advantages of this solution is its automated decision-making capability. Scheduled flows and Apex logic ensure that warehouse managers and recycling supervisors receive timely notifications and tasks, preventing delays and stockouts. Additionally, with well-defined user roles, profiles, and sharing rules, the system enforces data access controls and supports record-level security.

From the initial requirement gathering to final deployment and testing, this documentation outlines every phase of the project lifecycle. It covers the system's architecture, the logic implemented via triggers and test classes, the configuration of security models, and automation flows. Overall, this project not only provides a practical solution to a real-world sustainability issue but also demonstrates how Salesforce CRM can be effectively utilized to manage operational workflows, ensure accountability, and promote scalability for future enhancements.

Project Overview

The plastic waste management sector plays a critical role in addressing one of the most pressing environmental challenges of our time. With India generating over 3.4 million tonnes of plastic waste annually, efficient and sustainable waste management practices are vital for the nation's health, economy, and ecology.

Plastic recycling has emerged as a key strategy in promoting circular economy principles, where materials are reused and repurposed instead of being discarded. The Government of India, through initiatives such as the Plastic Waste Management Rules, Swachh Bharat Abhiyan, and Extended Producer Responsibility (EPR) policies, has been actively encouraging industries and local bodies to develop innovative solutions to reduce plastic pollution.

The sector is witnessing a technological shift, with companies integrating IoT, data analytics, and cloud platforms like Salesforce to monitor and optimize waste collection, recycling, inventory, and distribution processes. Sustainable startups and eco-conscious businesses are leading this change by adopting automation, traceability, and digital reporting for efficient plastic waste management.

With rising consumer awareness, stricter regulations, and growing investment in green technologies, the recycling and waste management industry is poised for substantial growth. It not only offers a pathway to environmental sustainability but also opens up opportunities for job creation, innovation, and circular product design.

The plastic waste management sector, thus, sits at the intersection of environmental responsibility and technological innovation — making it a vital domain for long-term sustainable development.

Objectives

The objective of the RePlastix Innovations CRM system is to develop a scalable, cloud-based solution that simplifies and automates the plastic waste recycling workflow. The project is built with the vision of transforming manual, paper-based processes into a streamlined digital system using Salesforce.

Key goals include:

- Digital Transformation: Replace outdated tracking methods with real-time digital records for plastic waste, stock levels, and recycling center data.
- Automation of Operations: Minimize manual intervention by using Apex logic and scheduled Flows to manage stock levels, restock alerts, and customer orders.
- Real-time Inventory Monitoring: Provide immediate visibility into current stock levels of recycled products and automate restocking if the threshold is breached.
- Role-based Access Control: Ensure sensitive data is accessed only by authorized personnel using roles, profiles, and sharing rules.
- Improve Decision-Making: Use dashboards and reports to monitor business performance and gain insights into waste collection, recycling trends, and stock movements.
- Sustainability Enablement: Support eco-conscious practices by enabling organizations to efficiently recycle and repurpose plastic waste, thus reducing environmental impact.

Phase 1: Requirement Analysis & Planning

This phase focused on understanding the business use-case and defining clear objectives to be achieved using Salesforce CRM.

1. Understanding the Business Requirements:

The initial step involved discussions with stakeholders to identify the pain points in their existing processes. The following core business requirements were identified:

- Plastic Waste Collection Tracking: The organization needed a systematic method to record various types of plastic waste collected, tagged by weight, type, and collection date, ensuring traceability and accountability.
- Recycling Center Capacity Management: Since centers have limited capacity, tracking their operational limits (current load vs total capacity) became essential to avoid overflows and inefficiencies.
- Real-time Stock Monitoring: There was a need to monitor the available quantity of finished recycled products at any given moment to avoid customer dissatisfaction due to delays or stockouts.
- Order Lifecycle Management: Customers placing orders for recycled products required a smooth process to confirm availability, schedule delivery, and generate restock requests if items were unavailable.
- Intelligent Restocking Mechanism: Manual restock tracking was inefficient. The system had to automatically detect low inventory levels and trigger internal workflows for replenishment.
- Data Transparency & Accountability: Different teams (collection, sales, warehouse) needed controlled access to data, with audit trails to track user activity and changes.

2. Defining the Project Scope

A well-defined scope was essential to prevent feature creep and maintain clarity across all phases of the project. The scope included both functional and technical deliverables:

Functional Deliverables:

- Create and configure five custom objects to map business entities:
  - Plastic_Waste__c
  - Recycling_Center__c

    - Recycled_Product__c
    - Order__c
    - Restock_Request__c
- Enable custom object relationships using lookup/master-detail fields for data integrity and dependency mapping.
- Ensure field-level validations to improve data reliability and prevent operational bottlenecks caused by incorrect inputs (e.g., future collection dates or zero quantities).
- Establish clear role-based access control, ensuring users only see and interact with records relevant to their responsibility.

Technical Deliverables:

- Design and implement:
    - Scheduled Flows to detect low stock.
    - Apex Triggers to handle real-time stock updates.
    - Apex Classes for backend business logic.
    - Email Notifications for timely restock alerts.
- Establish a robust data model, ensuring normalization, clarity, and scalability for future use cases (like vendor management or mobile app integration).
- Prepare documentation, test scenarios, and use cases for validation, testing, and potential handover.

3. Data Model and Security Design

The data model and security model form the core architectural layer of the application, ensuring seamless functionality while maintaining strict governance of access and usage.

Data Model:

- An Entity Relationship Diagram (ERD) was created to visualize and map object relationships and dependencies.
- Lookup and master-detail relationships were used wherever necessary:
  e.g., Orders are linked to Products; Restock Requests are linked to Orders and Products.
- Formula fields like Stock Status and Available Capacity were included to provide derived real-time insights.

Security Model:

- Profiles and Permission Sets were created for:
  - Recycling Manager
  - Sales Representative
  - Warehouse Supervisor
  - System Administrator
- Role Hierarchy was defined as:
  - CEO
    - Sales Representative
      - Warehouse Supervisor
- Organizational-Wide Defaults (OWD) were set to Private to ensure strict data visibility.
- Sharing Rules:
  - Enabled upward sharing (e.g., Supervisor → Sales Rep → CEO).
  - Configured record-level access depending on role and relevance.

Phase 2: Salesforce Development – Backend & Configurations

In this phase, the actual development began, where custom objects, fields, automation tools, and Apex classes were implemented.

Object and Field Creation:

Custom objects were created to represent real-world entities like plastic waste, recycled products, and orders. Each object had necessary fields like:

- **Recycled Product**: Stock_Level, Threshold, Price
- **Orders**: Product Reference, Quantity, Delivery Date
- **Restock Requests**: Requested Quantity, Status

Validation Rules:

- Prevent collection dates in the future.
- Disallow zero or negative order quantities.

Automation with Flows:

- A Scheduled Flow runs daily to check stock levels and create tasks when stock is below threshold.
- Task includes priority, owner ID, and a clear subject for action.

Apex Classes and Triggers:

- InventoryManager class handles stock decrement on order placement and increment on restock approval.
- EmailNotificationHelper sends auto-emails upon stock updates.
- Two triggers (UpdateStockAfterOrder, UpdateStockAfterRestockApproval) invoke class methods automatically based on business actions.

Phase 3: UI/UX Development & Customization

This phase focused on enhancing the user experience and interface design of the RePlastix Innovations app to ensure ease of use, efficient navigation, and visual clarity for users in various roles such as Recycling Manager, Warehouse Supervisor, and Sales Representative.

1. Lightning App Creation

A custom Lightning App titled "Re Plastic Innovations" was created using App Manager. It served as a unified workspace where users could easily access all five key objects:

- Plastic Wastes
- Recycling Centers
- Recycled Products
- Orders
- Restock Requests

Tabs were created for each object, and custom icons and styles were applied to improve the visual layout.

2. Page Layouts & Dynamic Forms

Each object was assigned a clean and role-appropriate page layout with essential fields grouped by sections (e.g., Product Info, Stock Details). Where applicable, dynamic forms were configured to:

- Display or hide fields based on conditions (e.g., Status or Quantity).
- Improve form usability by removing clutter and showing relevant data only.

3. User Management

Users were assigned appropriate profiles and roles, ensuring they viewed only what they needed. Permission Sets were used to provide additional access without altering core profiles.

4. Reports and Dashboards

Custom dashboards were designed for real-time monitoring:

- A Stock Dashboard shows products nearing or below threshold.
- A Restock Tracker dashboard visualizes pending and approved restock requests.
- Reports were grouped by status, date, or product type to support decision-making.

Phase 4: Data Migration, Testing & Security (Expanded)

Data Migration:

- Used the Data Import Wizard to load dummy records.
- Manual entry used for testing the automation process.

Testing Approach:

- Tested validation rules with invalid inputs.
- Created new order records and monitored whether stock updated correctly.
- Simulated “low stock” condition and verified if:
  - Task was generated.
  - Restock request was created.
  - Email was sent upon approval.

Security Measures:

- **OWD** set to Private to limit access by default.
  - **Sharing Rules**:
  - CEO → Sales Rep → Read access for Recycled Product.
  - Sales Rep → Warehouse Supervisor → Read access for Restock Requests.
- **Profiles** defined for each role with specific CRUD access.

Phase 5: Deployment, Documentation & Maintenance (Expanded)

This final phase involved preparing the application for real-world usability by ensuring smooth deployment, clear documentation, and long-term maintainability. Special focus was given to aligning all processes with best practices in Salesforce change management, ensuring that the system can evolve without disruption.

1. Deployment Strategy

The deployment process was planned and executed using Change Sets within the Salesforce environment. Key components like:

- Custom Objects
- Fields & Validation Rules
- Apex Classes & Triggers
- Flows & Workflow Rules
- Profiles & Permission Sets

...were carefully selected and grouped into outbound change sets for transfer to the target org. This ensured consistent and error-free deployment without manual rework.

Before deployment:

- All Flows were activated.
- Test Classes were run to validate 100% code coverage.
- Sharing settings and role hierarchies were reverified.

If required in a larger production environment, Salesforce CLI (SFDX) or Ant Migration Tool can also be used in future for automated deployments.

2. Documentation of Components

Comprehensive documentation was maintained throughout the development lifecycle. This included:

- Detailed descriptions of each object and its fields.
- Logic used in validation rules and formula fields.
- Flow diagrams showing the scheduled automation and task creation.
- Apex class and trigger explanations with inline comments for readability.
- Testing scenarios and expected outcomes for each module.

3. Testing, Debugging & Maintenance

To ensure long-term success and user satisfaction, the system was designed with troubleshooting and maintenance mechanisms:

- Debug Logs were enabled during testing to capture system behavior and errors.
- Test data was used to simulate different scenarios (e.g., stock depletion, over-ordering).
- Field History Tracking was turned on for critical fields like Stock_Level__c and Status__c.
- Exception handling was added in Apex classes to prevent runtime failures.
- Users were trained to monitor dashboards and reports to catch anomalies early.

Regular checks were suggested post-deployment, including:

- Monitoring scheduled flows for execution success.
- Reviewing error logs via Setup → Debug Logs.
- Validating emails sent via Email Logs.

4. Sustainability of the System

The application was built with scalability and maintainability in mind. Modular object design, clear naming conventions, and well-commented Apex code ensure future developers can add enhancements like:

- New product categories
- Workflow extensions
- Integration with external systems (e.g., ERP, IoT sensors)

OUTCOMES

The following are the key outcomes and deliverables achieved during the course of this internship project:

- Successfully developed a custom Salesforce application tailored for plastic waste and recycled inventory management.
- Created five custom objects representing core business entities: Plastic Waste, Recycling Centers, Recycled Products, Orders, and Restock Requests.
- Configured a Lightning App with a user-friendly interface and tab-based navigation.
- Implemented a role-based access control model, using roles, profiles, sharing rules, and OWD settings to ensure secure data access.
- Designed and executed validation rules to maintain data quality and enforce business logic (e.g., no future collection dates, valid quantities).
- Built a scheduled Flow to automate daily stock checks and generate tasks for restocking actions, improving operational response time.
- Developed Apex Classes and Triggers to handle:
    - Stock deduction after order placement
    - Auto-generation and approval of restock requests
    - Inventory updates based on approval status
- Integrated email notifications using Apex to inform the warehouse manager when restocks are approved.
- Created custom reports and dashboards to visualize real-time data on stock levels, collection trends, order status, and pending restocks.
- Achieved 100% test coverage using well-structured Apex test classes to validate core automation and logic components.
- Gained practical experience in Salesforce development, automation, testing, and deployment — essential skills for real-world CRM applications.

CONCLUSION

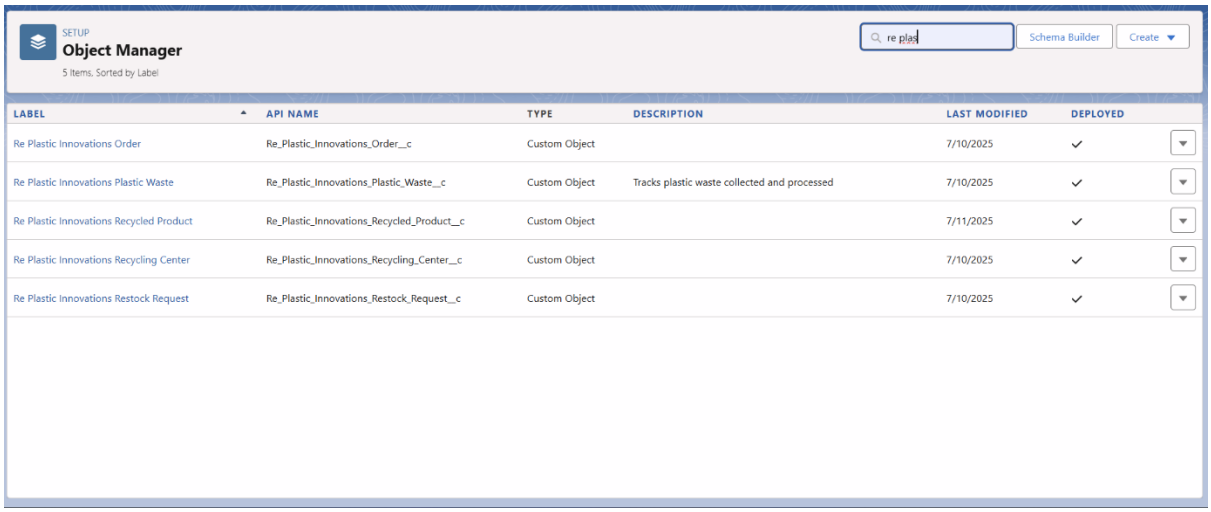
The internship project at SmartBridge provided a valuable opportunity to apply my technical knowledge to a socially impactful real-world scenario through the implementation of a Salesforce-based solution for RePlastix Innovations. The project successfully addressed the key operational challenges faced by the organization, such as manual tracking of plastic waste, inventory mismanagement, and lack of automation in order processing and restocking workflows.

By leveraging the powerful features of the Salesforce platform, including custom objects, role-based security, Flow Builder, Apex programming, and real-time reporting, I was able to design a solution that improved efficiency, accuracy, and communication across departments. The system ensured better stock control, reduced delays in replenishment, and enabled proactive decision-making through dashboards and alerts.

This internship enhanced my understanding of enterprise-grade application development and deepened my skills in data modeling, automation, and CRM implementation. It also reinforced the importance of sustainable innovation and how technology can support eco-friendly initiatives in a measurable way.

Overall, the internship was a highly enriching and rewarding experience that prepared me for future roles in cloud technology and CRM development.

APPENDICES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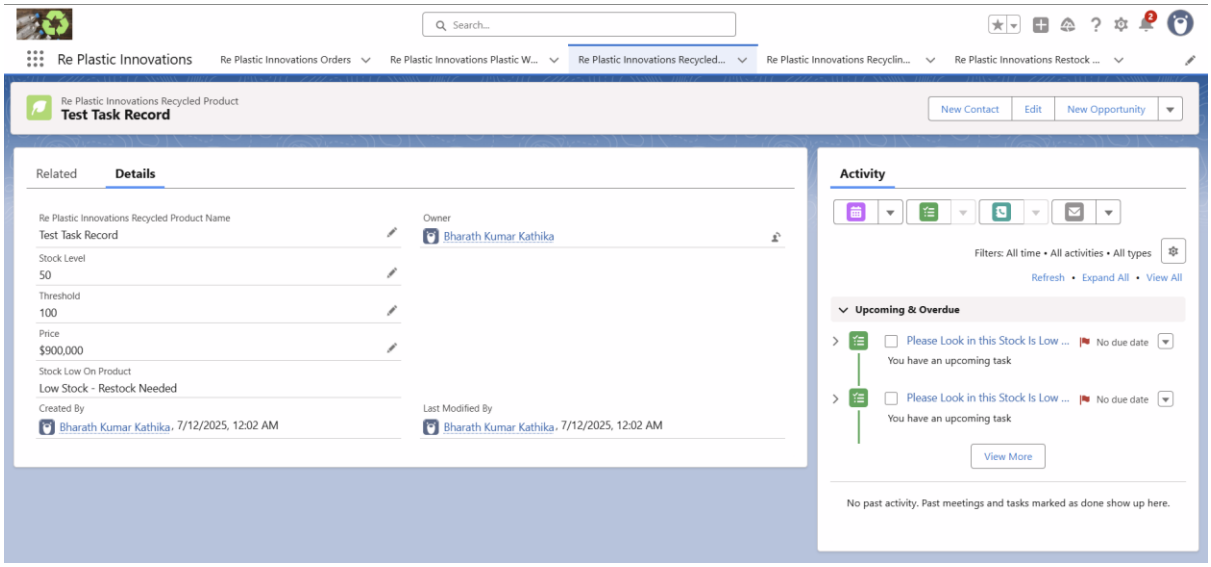
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Threshold
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Price
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Stock Low On Product
Low Stock - Restock Needed
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Upcoming & Overdue
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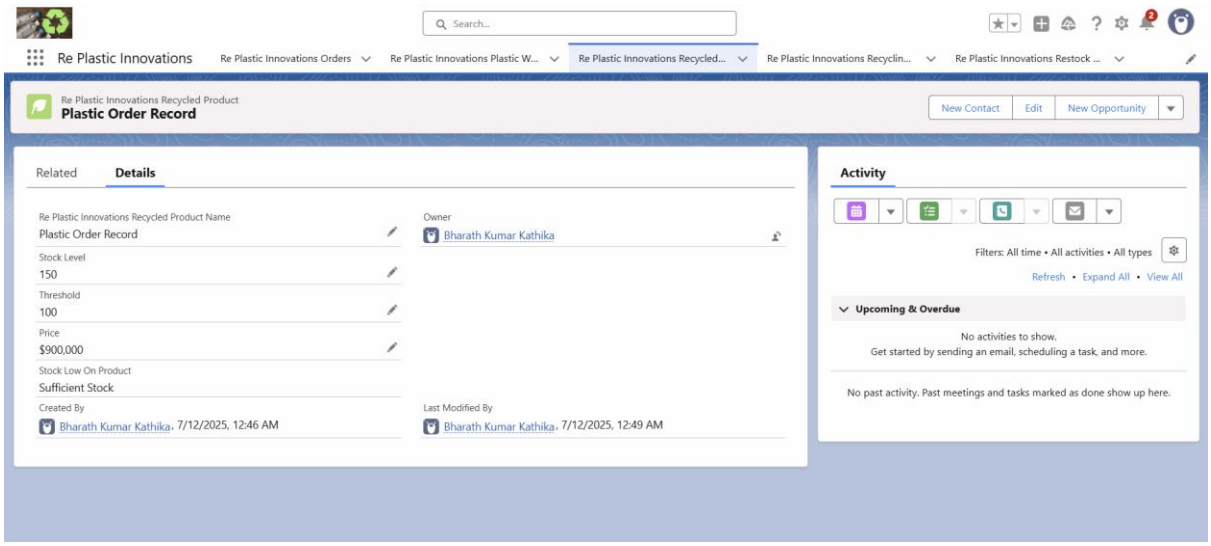
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Activity
Filters: All time • All activities • All types
Refresh • Expand All • View All
Upcoming & Overdue
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Get started by sending an email, scheduling a task, and more.
No past activity. Past meetings and tasks marked as done show up here.

Future Enhancements

- **AI-Powered Recommendations**: Implement Einstein Analytics to predict which products might go low on stock based on trends.
- **Mobile App Integration**: Allow field agents to log waste collections using Salesforce Mobile App.
- **Live Inventory Updates**: Integrate IoT-based sensors from recycling centers to auto-update product quantity.
- **Multi-language Support**: Add translation workbench for multilingual use in different regions.
- **Approval Processes**: Introduce formal multi-stage approval processes for high-volume restock requests or orders.