The Recycling and Upcycling Platform   Approved by Siddharth Dash
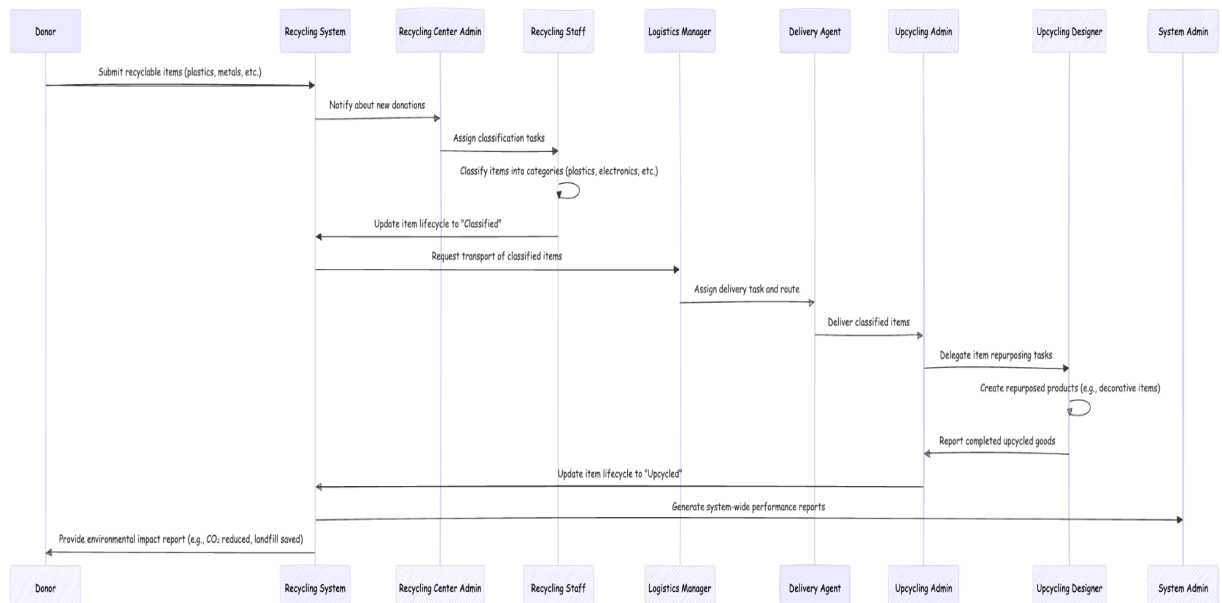
Problem Statement:

Waste management is an issue that has become crucial to the global environment, with landfills filling up day by day and resources being wasted. Huge environmental degradation is the result of improper disposal through pollution, resource depletion, and increase in carbon emissions of recyclable materials such as plastics, electronics, and paper.

While there is an increasing sensitivity for the need to recycle, generally, a lack of an effective collection, classification, and distribution platform often discourages participation. In its existing form, donors are unaware of how their contribution makes a difference, and recycling centers cannot track and manage effectively the materials coming into them.

Solution:

The Recycling and Upcycling Platform offers seamless management of donations of recyclable material. It connects the donor with the recycling centers and organizations participating in upcycling to ensure that recyclable materials are collected, categorized, and tracked efficiently.

In addition to facilitating the donation process, this system enables donors to view environmental impact reports showing the state of their contributions toward the sustainability goals. This is done by tracking the lifecycle of items donated, thus ensuring accountability and transparency in everything it does-from collection to reuse.
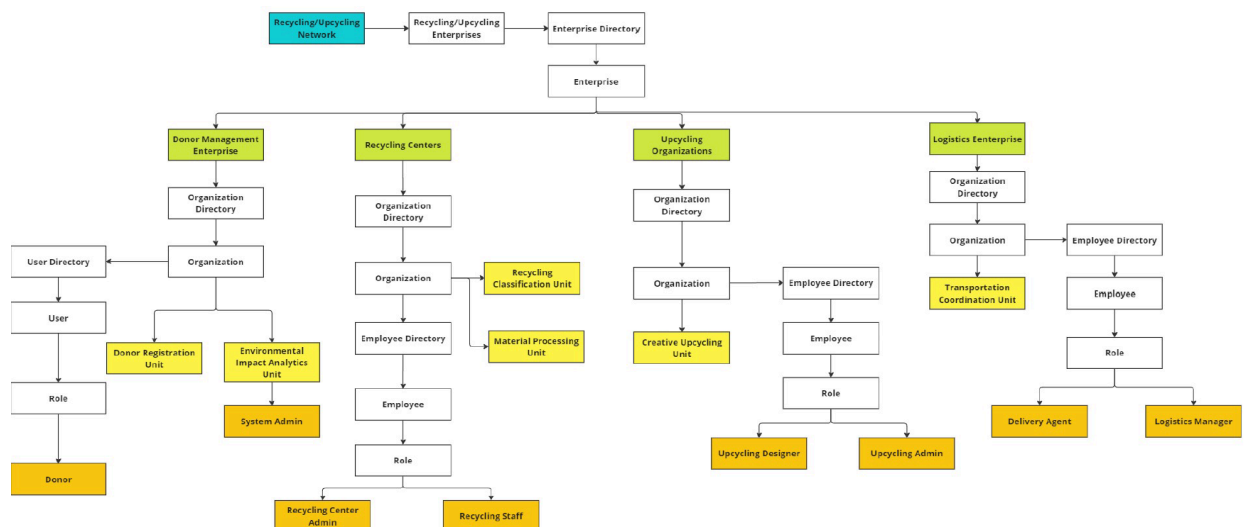
High-level component diagram:

The sequence diagram depicts the process flow of a recycling and upcycling system, showcasing the interaction between various actors such as donors, the recycling system, logistics, and upcycling teams. It begins with donors submitting recyclable items like plastics and electronics to the recycling system. The system notifies the recycling center admin, who assigns tasks to recycling staff for classification. The staff categorize the items into specific types (e.g., plastics, electronics) and update their status in the system. Once classified, the items are scheduled for transport by the logistics manager, who assigns delivery tasks to agents responsible for ensuring the items reach the designated locations.

In the next phase, upcycling admins delegate tasks to designers or other specialists to repurpose the recycled items into new products. Once the upcycling process is complete, the system updates the items' status and generates reports on system performance and environmental impact, such as landfill reduction metrics. This comprehensive workflow highlights a sustainable cycle from collection to repurposing, emphasizing efficient task delegation, clear communication, and system-driven updates at every step. It provides a streamlined approach to managing recycling and upcycling processes effectively.

Class Diagram:

Component Explanation:

Ecosystem:
Ecosystem is the top most component in the hierarchy level of recycling/upcycling process. It is responsible for the entire process and overlooks the relationship between different entities in the process such as Donors, Recycling Centres, Upcycling Organizations and Logistics Services.

Recycling/Upcycling Network:
The Recycling/Upcycling Network is a subset of the ecosystem which is responsible for streamlining the workflow between different enterprises and ensures efficient recycling and Upcycling Process.

Enterprises (Four Enterprises)

Donor Management Enterprise:
This Enterprise controls all the donor related activities such as registration of donor, donations made by donors and also tracking the lifecycle of recyclable items.
Organization Included: Donor Registration Units and Environment Impact Analysis
Roles Included: Donor, System Admin

Recycling Centres:
This Enterprise is focused on storing and classification of products that have been received for recycling
Organization Included : Material Processing Unit , Recycling Classification Unit.
Roles Included: Recycling System Admin, Recycling Staff.

Upcycling Organization:
Upcycling Organization is committed to deliver upgraded products out of used products by Upcycling the products
Organization Included : Creative Upcycling Unit
Roles Included: Upcycling Designer, Upcycling Admin

Logistics Enterprise:
They are responsible for logistics of products from donors to recycling centers and upcycling organizations and vice versa.
Organization Included : Transportation Coordination Unit
Roles Included: Delivery Agent, Logistics Manager

Organizations (Six Organizations)

Donor Registration Unit:
They handle registrations of donors, donation scheduling and tracking the contributions made by donors.

Environment Impact Analysis
They deliver Environmental impact analysis reports to the donors so that donors have knowledge of how much improvement their contribution has brought to the enviorment.

Material Processing Unit
The Material Processing unit is responsible for converting the raw materials for the further use.

Recycling Classification Unit
They categorize the donated products or materials into different categories such as plastic, metal, paper etc.

Creative Upcycling Unit
This organization designs the used materials and improvises on the materials.

Transportation Coordination Unit
Transportation Coordination Unit are focused on route planning, delivery agent and vehicle assignment for delivery of materials.

Roles (Eight Roles)

Donor:
Donors are key contributors in the process as they donate the materials that can be recycled or upcycled.

System Admin:
System Admin looks over the whole recycling/upcycling Process and provides donors with environmental Impact analysis reports.

Recycling Center Admin:
This role is responsible for supervision of the entire recycling process and ensures proper sorting and classifications of materials.

Recycling Staff:
They are responsible for performing sorting and classification of materials.

Upcycling Admin:
This role is responsible for supervision of the entire Upcyclingg process and coordinates with the desginer.

Upcycling Designer:
Designers are responsible for recreating new products from the repurposed materials.

Logistics Manager:
Logistics Manager is focused on planning efficient transportation routes and delivery agents assignment.

Delivery Agents:
They are responsible for transporting materials between donors, recycling centers and upcycling organizations.