TEAM NAME: 17_Ecolife

DOMAIN: Sustainability and Green Economy
PROBLEM STATEMENT: Resource Usage and Impact Analytics Platform

Functional Requirements

Functional requirements describe what the system is supposed to do, including the services it provides and the actions it performs in response to user input.

User Management

- Users can register, login, and logout
- Users can update personal and organizational profiles
- Role-based access control: Resource User, Sustainability Manager, Operations Manager
- Admin can manage user roles and permissions

B. Resource Usage Management

- Resource Users can submit resource usage data (energy, water, fuel, etc.)
- System validates submitted usage data
- Usage data is stored with timestamps and user reference
- System checks usage against predefined thresholds
- Generate alerts when usage exceeds thresholds

C. Environmental Impact Analysis

- Sustainability Manager can request environmental impact analysis
- System retrieves usage data
- System retrieves emission factors from Emission Factors Database
- System calculates environmental impact (e.g., carbon footprint)
- Display environmental impact summary to manager
- Notify managers when required data is missing

D. Sustainability Targets & Progress Tracking

- Sustainability Manager can define sustainability targets (emission reduction, usage limits)
- System validates target inputs
- Store sustainability targets securely
- Track progress against defined targets
- Compare actual impact with targets
- Display progress status and trend indicators

E. Usage Overview & Consumption Trends

- Users can request usage overview
- System identifies user role (personal or managerial view)
- Retrieve and filter usage data
- Provide personal usage summary for Resource Users
- Aggregate data for overall trends for Managers
- Analyse usage patterns and generate trend insights

F. Alerts & Notifications

- Send usage alerts when thresholds are exceeded
- Notify users about successful submissions
- Notify managers about missing or inconsistent data
- Display system notifications in real time

G. Reporting & Monitoring

- Generate reports on resource usage and environmental impact
- View dashboards for usage, emissions, and targets
- Maintain audit logs for submissions and changes
- Export reports for compliance and review

Non-Functional Requirements

Non-functional requirements specify quality attributes and constraints of the system such as performance, security, and reliability.

A. Product Requirements

1. Efficiency Requirements

- System should handle multiple concurrent users
- Data retrieval and analysis should be optimized

2. Performance Requirements

- Page response time ≤ 2 seconds
- Impact calculations should complete within acceptable time limits

3. Space Requirements

- Efficient database storage for usage and emission data
- Archive historical data without performance degradation

4. Usability Requirements

- Simple and intuitive UI
- Dashboard-based visualization
- Mobile and tablet friendly interface

5. Dependability Requirements

- System availability 24/7
- Data backup and recovery mechanisms
- High reliability for critical calculations

6. Security Requirements

- Secure authentication and authorization
- Role-based access control
- Encryption of sensitive data

B. Organizational Requirements

1. Operational Requirements

- Web-based system
- Cloud deployment support

2. Environmental Requirements

- Operates under low bandwidth conditions
- Optimized for continuous monitoring systems

3. Development Requirements

- Modular architecture
- Easy to maintain and extend
- Use standard UML and software engineering practices

C. External Requirements

1. Regulatory Requirements

- Compliance with environmental reporting standards
- Support regulatory audits

2. Ethical Requirements

- Accurate representation of usage and impact data
- No manipulation of sustainability metrics

3. Legislative Requirements

- Compliance with data protection and IT laws
- Maintain legal audit trails

4. Accounting Requirements

- Track sustainability investments and efficiency gains
- Generate reports for management review

5. Safety / Security Requirements

- Protection against unauthorized access
- Secure communication with external databases

UML Diagrams

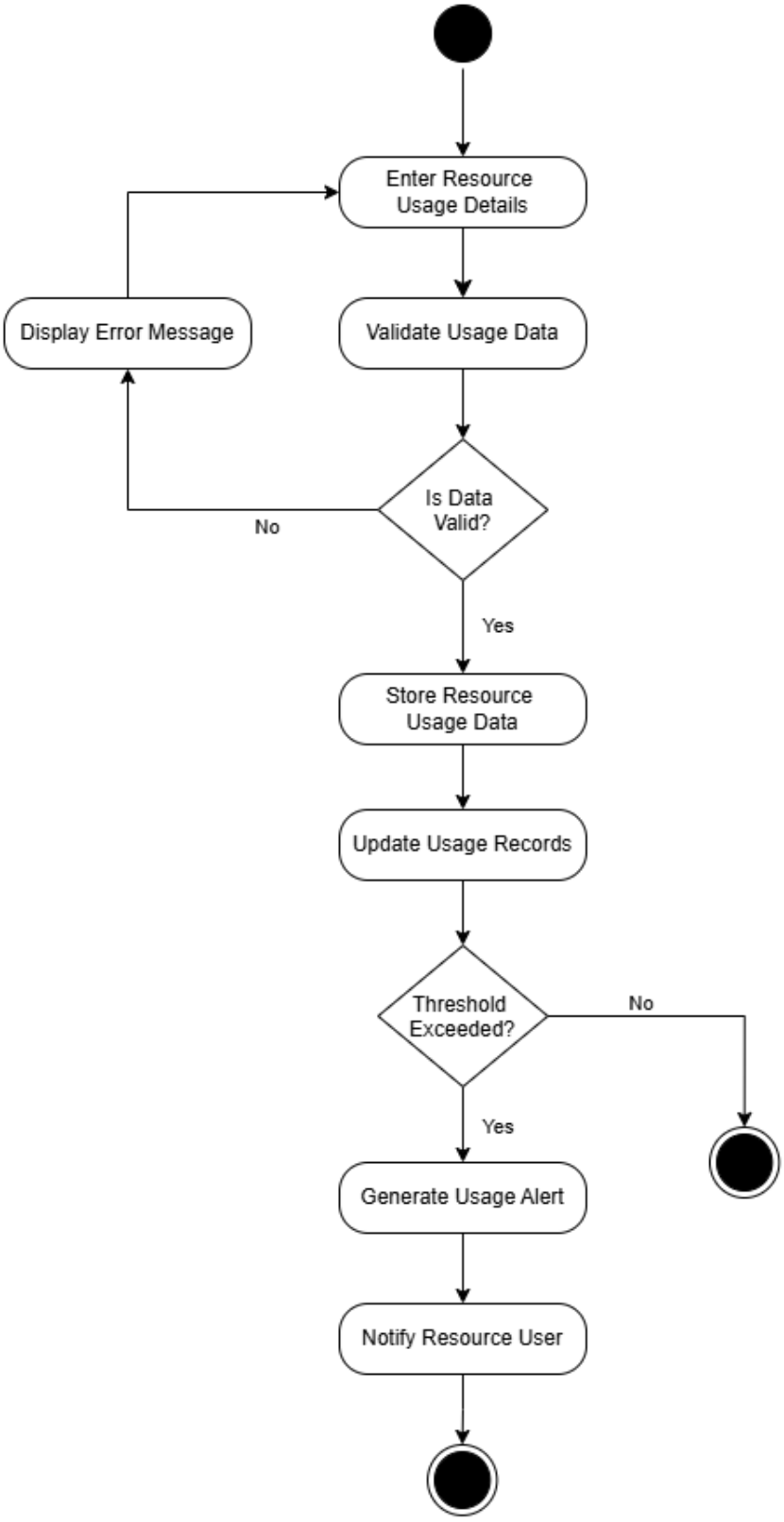
The system includes the following UML diagrams:

- Use Case Diagrams
- Activity Diagrams
- Sequence Diagrams (4 core diagrams):
    1. Submit Resource Usage Data
    2. Review Environmental Impact
    3. Track Sustainability Targets & Progress
    4. View Resource Usage & Consumption Trends

UML Diagrams are below :

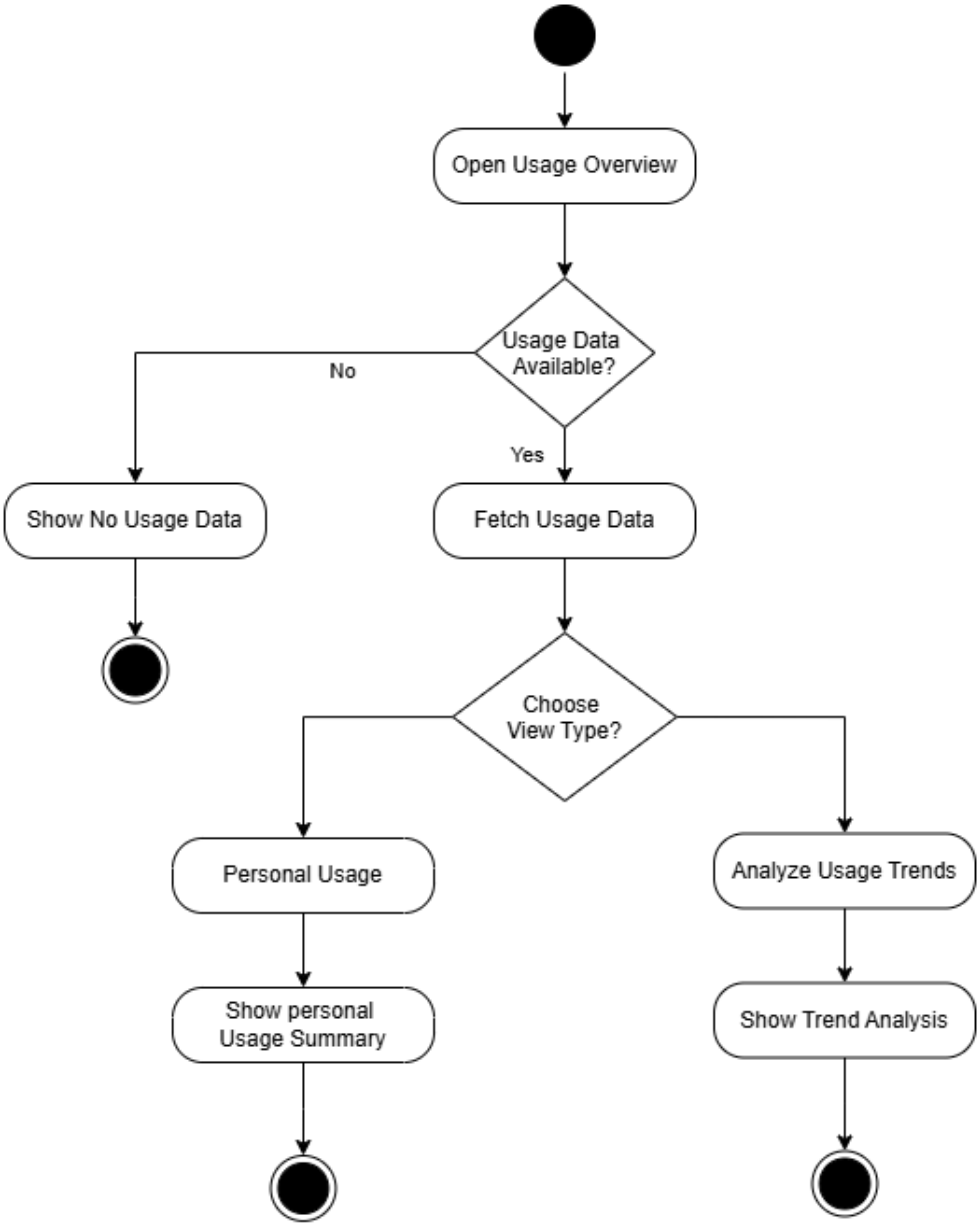
Submit Resource Usage Data

(Resource User)



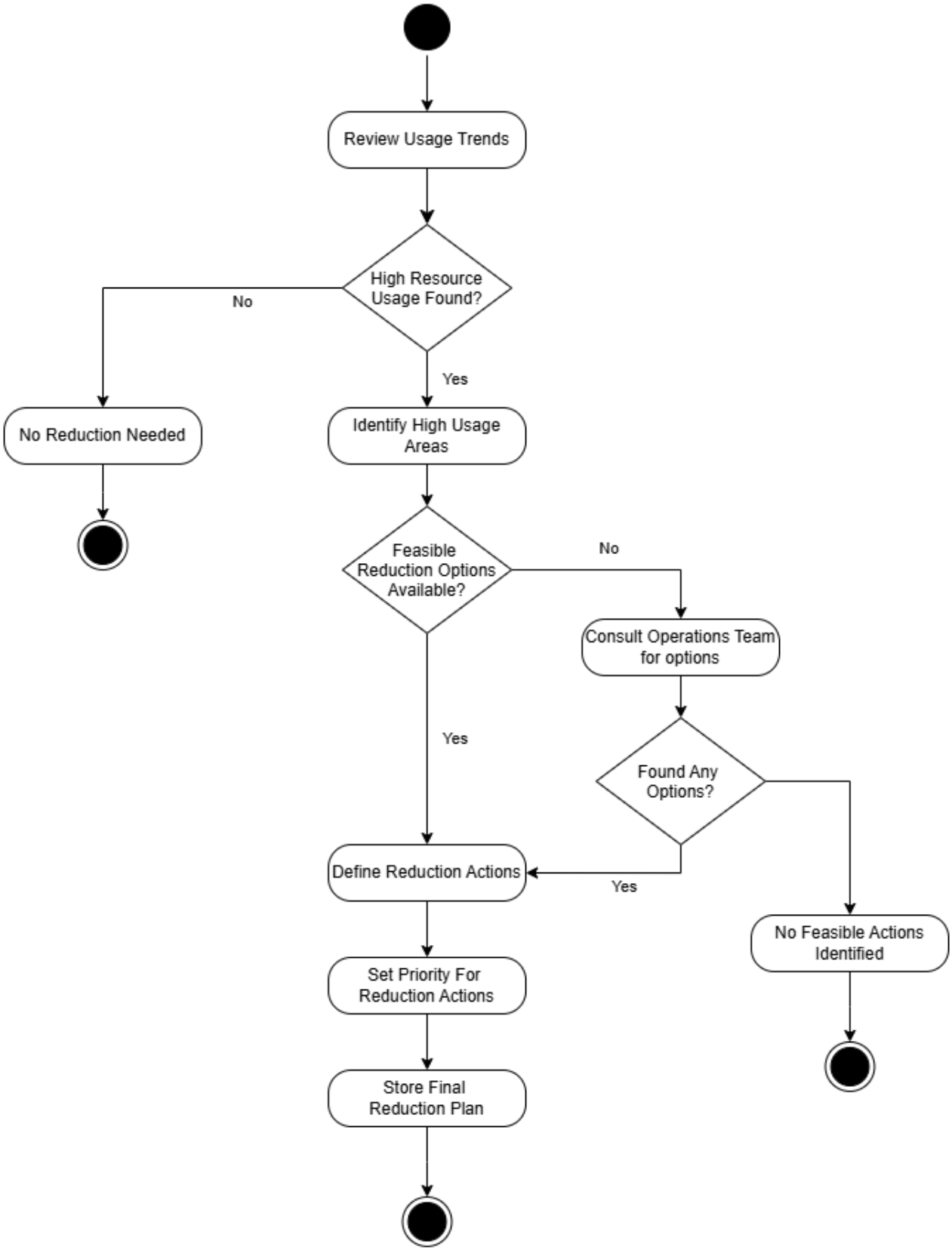
View Resource Usage & Consumption Trends

(Operational Manager, Resource User)



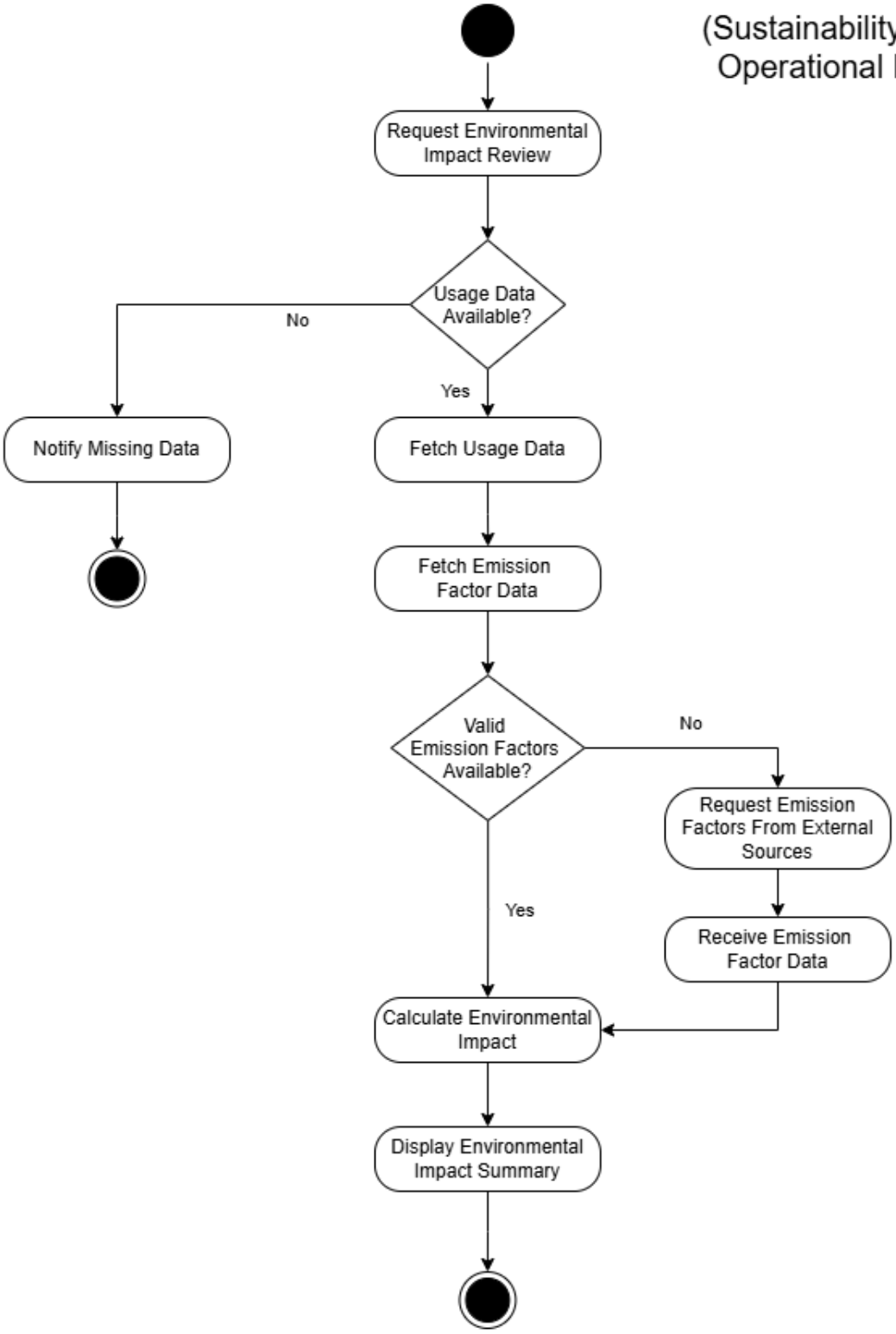
Plan Resource Optimization Actions

(Operations Manager)



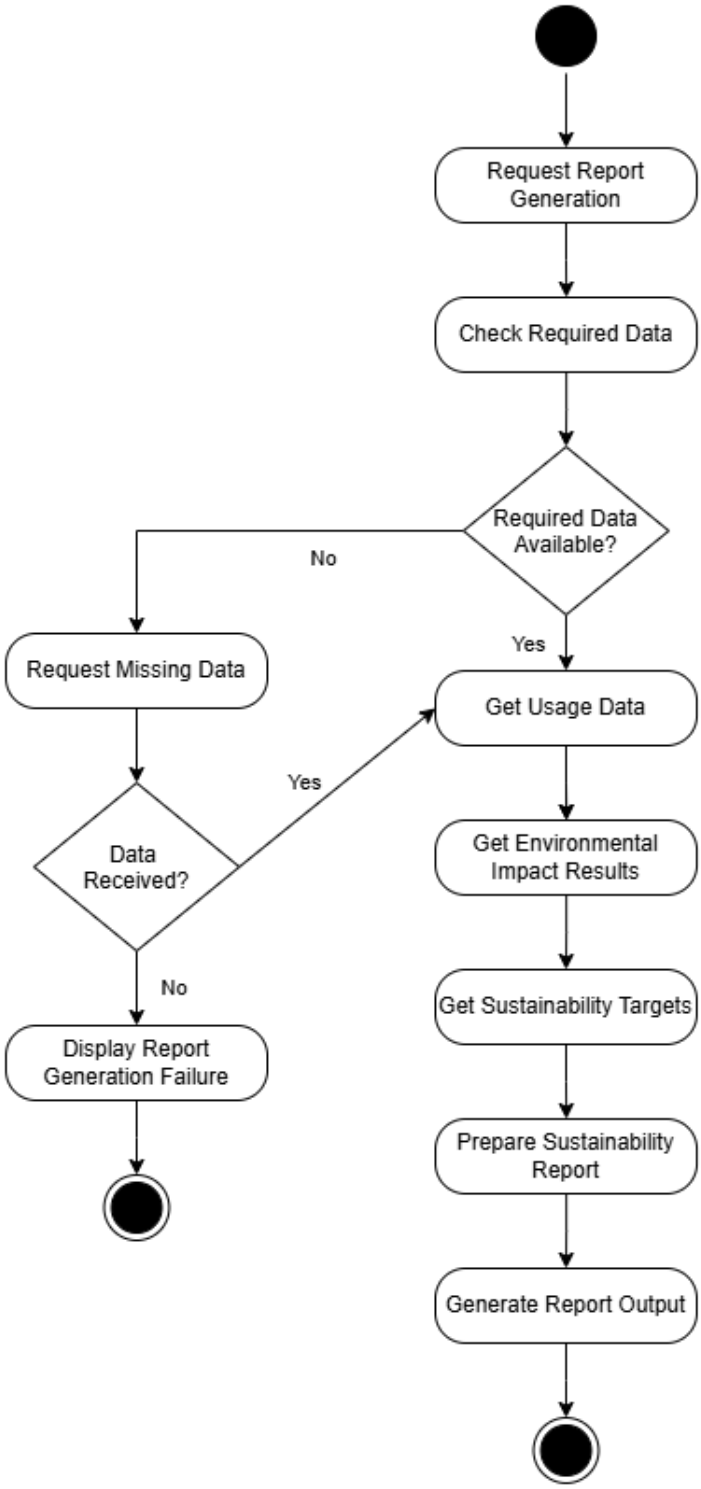
Review Environmental Impact

(Sustainability Manager, Operational Manager)



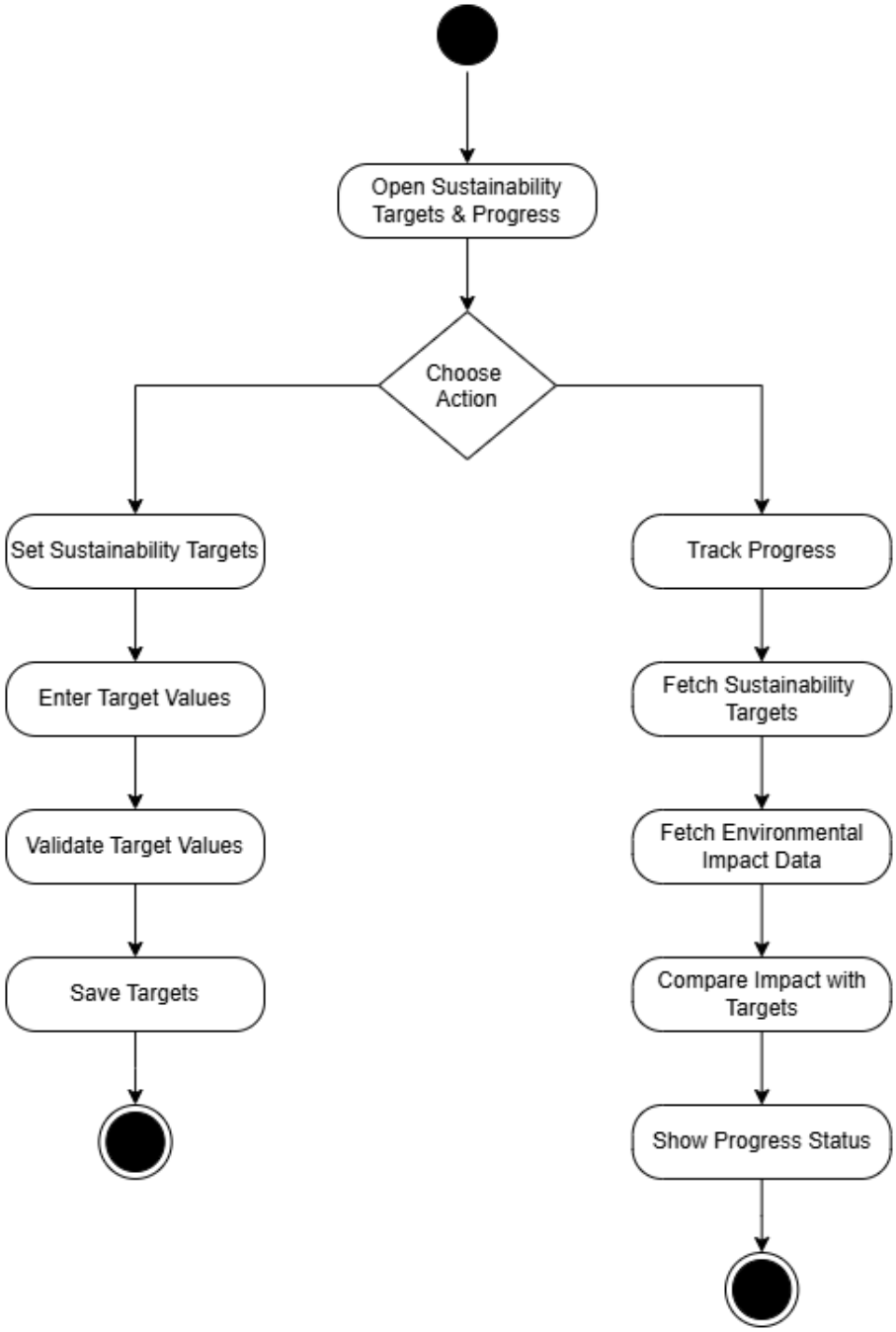
Generate Sustainability Reports

(Sustainability Manager)



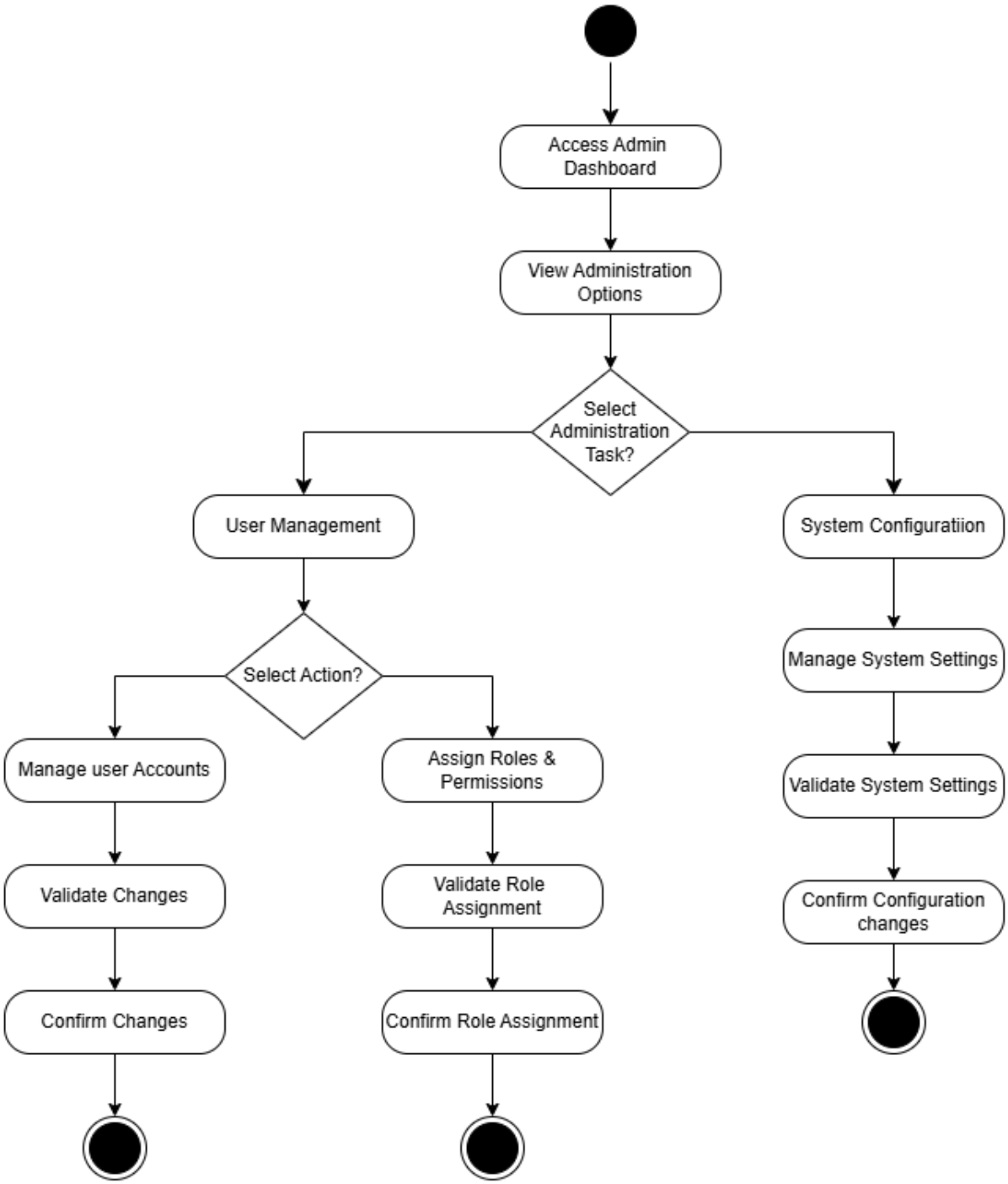
Track Sustainability Targets & Progress

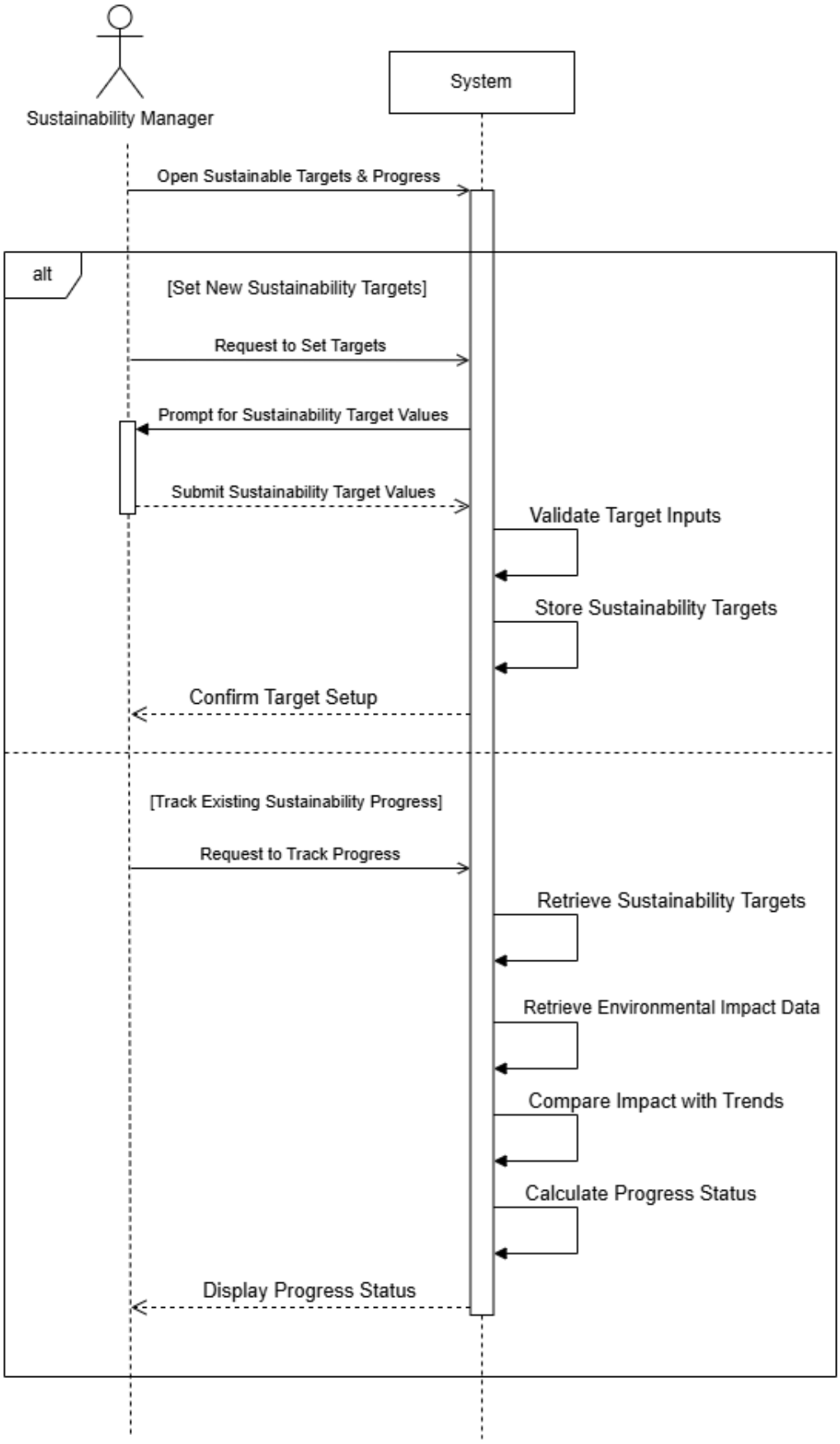
(Sustainability Manager)

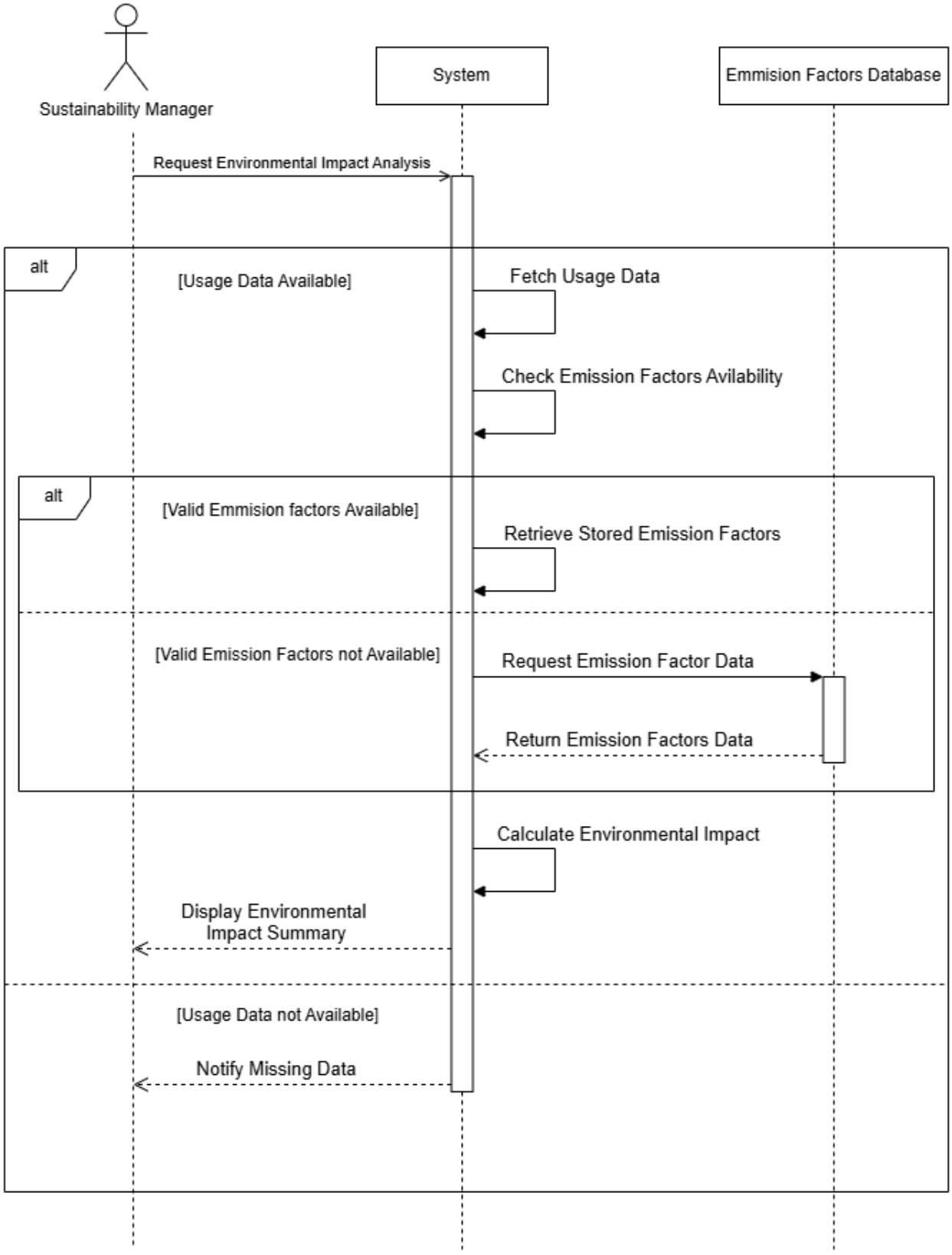


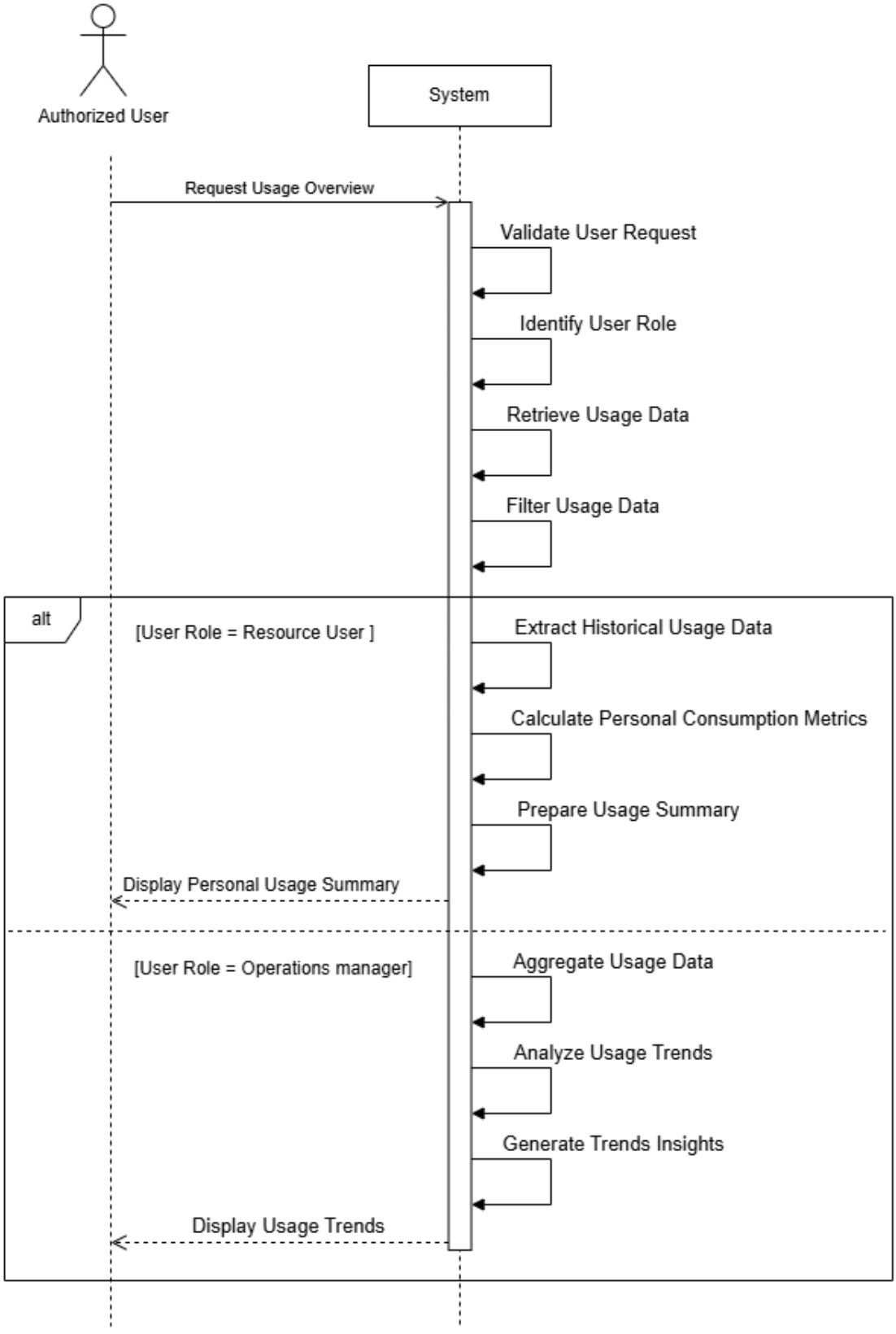
System Administration

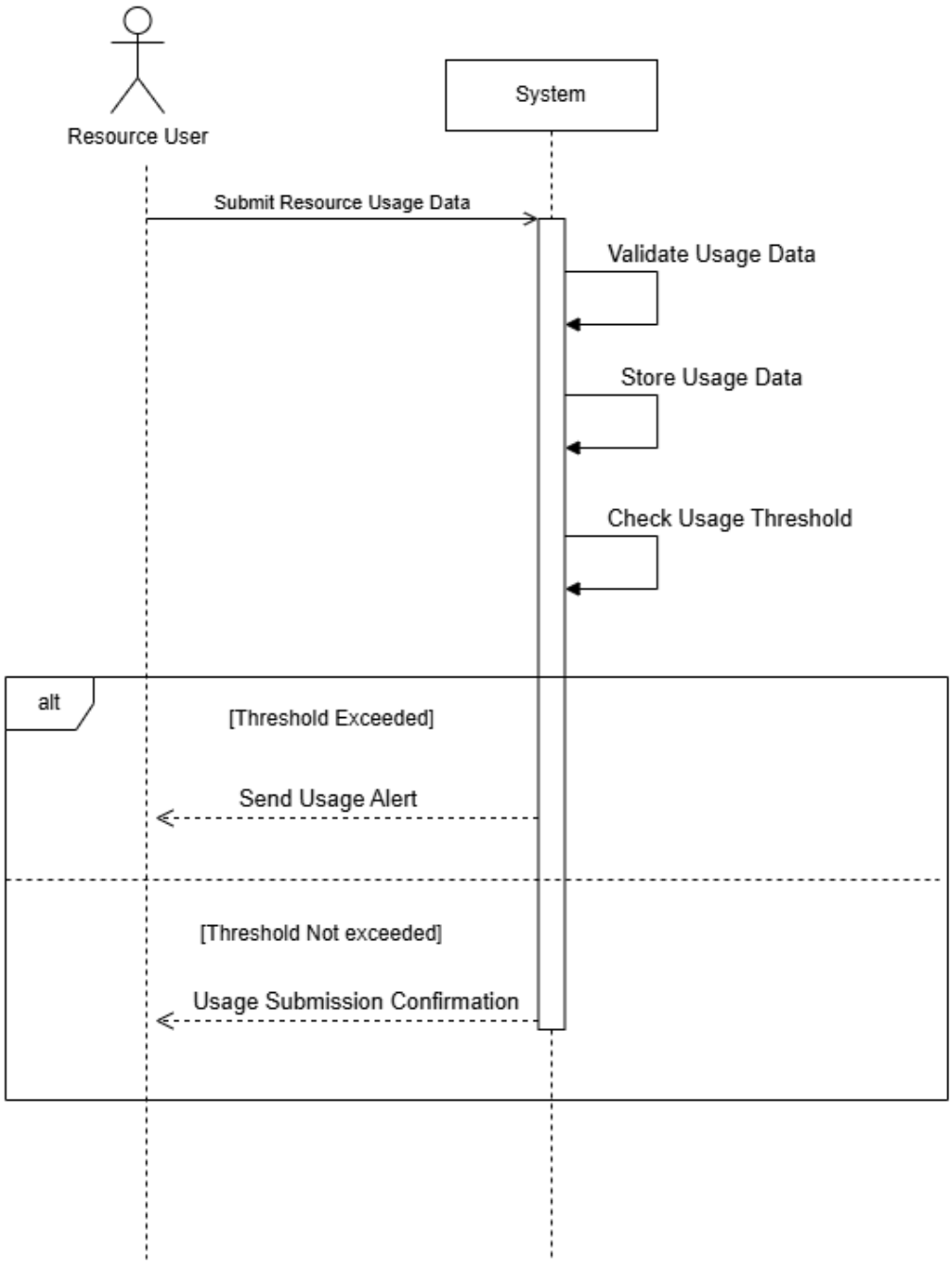
(System Administrator)




Sustainability Manager
System
Open Sustainable Targets & Progress
alt
[Set New Sustainability Targets]
Request to Set Targets
Prompt for Sustainability Target Values
Submit Sustainability Target Values
Validate Target Inputs
Store Sustainability Targets
Confirm Target Setup
[Track Existing Sustainability Progress]
Request to Track Progress
Retrieve Sustainability Targets
Retrieve Environmental Impact Data
Compare Impact with Trends
Calculate Progress Status
Display Progress Status


Sustainability Manager
System
Emmision Factors Database
Request Environmental Impact Analysis
alt
[Usage Data Available]
Fetch Usage Data
Check Emission Factors Avilability
alt
[Valid Emmision factors Available]
Retrieve Stored Emission Factors
[Valid Emission Factors not Available]
Request Emission Factor Data
Return Emission Factors Data
Calculate Environmental Impact
Display Environmental Impact Summary
[Usage Data not Available]
Notify Missing Data


Authorized User
System
Request Usage Overview
Validate User Request
Identify User Role
Retrieve Usage Data
Filter Usage Data
alt
[User Role = Resource User]
Extract Historical Usage Data
Calculate Personal Consumption Metrics
Prepare Usage Summary
Display Personal Usage Summary
[User Role = Operations manager]
Aggregate Usage Data
Analyze Usage Trends
Generate Trends Insights
Display Usage Trends


Resource User
System
Submit Resource Usage Data
Validate Usage Data
Store Usage Data
Check Usage Threshold
alt
[Threshold Exceeded]
Send Usage Alert
[Threshold Not exceeded]
Usage Submission Confirmation