

**Name : PREMA**

**Course: B.TECH IN CSE**

**Subject : DESIGN THINKING FOR SOFTWARE ENGINEERING(DT)**

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**Register No:** 24BTCE145

**Semester:** IV

## **Lab 1: Problem Discovery and Need Identification through Observation, Interviews, Pain-Point Analysis, Root Cause Identification, and Wicked Problem Understanding.**

### **Step 1: Observation**

- Most users reported that waste is not collected on fixed days or times, leading to confusion and inconvenience.
- Irregular collection causes garbage to pile up, leading to foul odors and unsanitary surroundings.
- Users observed an increase in mosquitoes, flies, and stray animals, raising the risk of diseases.
- The issue creates stress, embarrassment, and discomfort among residents.
- Users believe staff shortages, vehicle breakdowns, and poor planning are key reasons for irregular service.

### **Step 2: User Identification**

## **1. Households**

### **Roles:**

- Generate household waste
- Place waste outside for collection
- Follow waste segregation rules

### **Expectations:**

- Regular and timely waste collection
- Clean and hygienic surroundings
- Advance information about schedule changes

## **2. Municipal Authorities**

### **Role:**

- Allocate manpower and vehicles
- Monitor service performance
- Address public complaints

### **Expectations:**

- Efficient waste management system
- Reduced public complaints
- Compliance with sanitation and health regulations
- Improved cleanliness in the city

## **3. Waste Collection Workers**

**Role:**

- Collect waste from residential areas
- Transport waste to disposal or processing sites
- Follow assigned routes and schedules

**Expectations:**

- Clear work schedules
- Proper equipment and vehicles
- Support from authorities

**Step 3: Interviews / Surveys**

1. Is waste collection regular in your area?
2. How often is waste collected in your area?
3. What problems do you face due to irregular waste collection?
4. What do you think is the main reason for irregular waste collection?
5. Who do you think is most affected by irregular waste collection?
6. How do you currently manage waste when collection is delayed?
7. Would a mobile app or SMS alert system help in improving waste collection?

**Key responses from Interviews**

Most users reported that waste collection happens daily in their area.

1. According to the survey results, the majority of the users confirmed that waste collection is regular in their area.
2. Due to irregular of waste collection the chance of increasing Mosquitoes and files.
3. Most users believe that negligence is the main reason for irregular waste collection.
4. Most users feel that everyone is affected by irregular waste collection.
5. Most users reported that they store waste at home when collection is delayed.
6. Most users were not sure whether a mobile app or SMS alert system would help improve waste collection.

1	Timestamp	1. Name	2. Age	3. Where do you live? Example: Urban / Semi-urban/ Rural	4. How often is waste collected in your area?	5. Is waste collection regular in your area?
2	15/01/2026 18:18:31	Ranjith	18-25	No	Daily	No
3	15/01/2026 18:24:33	PRAKASH D N	36-45	Semi Urban	Daily	Yes
4	15/01/2026 18:31:26	Soni Taj.S	18-25	Urban	Alternate days	Yes
5	15/01/2026 18:31:56	Snehal Raju	18-25	Semi urban	Daily	Yes
6	15/01/2026 18:33:04	HAJIMALANG	26-35	Semi urban	Alternate days	No
7	15/01/2026 18:38:26	Shravani.G	18-25	Rural	Once a week	No
8	15/01/2026 18:46:21	SHASHUDHARA N	18-25	Rural	No fixed schedule	No
9	15/01/2026 18:55:53	Ashwini	18-25	Urban	Alternate days	No
10	15/01/2026 19:04:57	HAJIMALANG	26-35	SEMI URBAN	Alternate days, Once a week	No
11	15/01/2026 19:05:35	Somashekharagouda	18-25	Semi-urban	Daily	Yes
12	15/01/2026 19:07:11	Kalyan Kumar S	18-25	Urban	Alternate days	No

1	6. What problems do you face due to irregular waste collection?	7. What do you think is the main reason for irregular waste collection?	8. Who do you think is most affected by irregular waste collection?	9. How do you currently manage waste when there is no collection?	10. Would a more effective waste collection system improve your life?
2	Stray Animals	Lack of workers	Everyone	Other	No
3	Bad smell, Mosquitoes and flies, No major problem	Lack of workers, Poor planning, Negligence	Children, Elderly people, Working professionals, Slum dwellers	Other	Not sure
4	Bad smell, Mosquitoes and flies, Stray Animals, Health issues	Poor planning, Negligence	Children, Elderly people, Working professionals, Slum dwellers	Other	Yes
5	Bad smell, Mosquitoes and flies, Stray Animals, Health issues	Poor planning, Negligence	Children, Elderly people, Working professionals	Dispose it elsewhere	Yes
6	Bad smell, Mosquitoes and flies, Stray Animals, Health issues	Lack of workers, Poor planning, Vehicle problems, Slum dwellers	Children, Elderly people	Store waste at home, Dispose it elsewhere, Burn waste	Not sure
7	Health issues	Poor planning, Negligence			No
8	Bad smell	Lack of workers	Children, Elderly people	Store waste at home	No
9	Bad smell, Mosquitoes and flies, Health issues	Lack of workers, Vehicle problems	Everyone	Store waste at home, Dispose it elsewhere	Not sure
10	Bad smell, Mosquitoes and flies, Stray Animals, Health issues	Lack of workers, Poor planning, Vehicle problems	Children, Elderly people, Working professionals	Store waste at home, Burn waste	Not sure
11	No major problems	Poor planning, Vehicle problems	Everyone	Other	Not sure
12	Mosquitoes and flies	Lack of workers	Everyone	Dispose it elsewhere	Yes

## 11. Any suggestions to improve waste collection services?

19 responses

Don't be negligence

Need to clean always with surrounding place or home

Waste collection is proper in urban areas but not in rural areas.

So, rather than focusing just on urban areas, the focus should be on rural areas where most people throw it on roads, in rivers etc.

And the problems are being faced mostly in rural areas due to this problem.

Keep clean

Cleaning is necessary

People should take the matter seriously and avoid unnecessary throwing of garbage somewhere in streets.

Until and unless we people don't realise the duty to protect environment there is no way to improve anything. Because it is not ignorance it is Indifference. People knowing fully well Don't perform their duty until the situation demands. Even these municipalities cannot claim that lack of funds for non performance of duty which is decided in case of RATLAM MUNICIPALITY VS VARDICHAND.

Yes

Better education and segregation

Suggestions,ideas,can definitely help to improve waste collection services but the matter is implementing and post monitoring of those ideas because post monitoring plays very important role and that is missing in our societies.Awareness regarding sustainable development, balancing the production and consumption patterns,polluter pays principle,penalties to each and everyone may help in improving waste collection along with reducing waste generation.

Nothing

Avoiding manufacturing the waste

It's everyone's duty to segregate waste and dispose it properly

No.

Increase collection frequency and ensure timely pickup to avoid waste accumulation

Yes, The waste collection should not only done in certain layouts but also in the main roads.  
If anyone is throwing garbage in restricted areas should be severely punished or make them to face a rupees of fine.

On

Yes must and should daiy waste collector do the his duty.

## Interview summary :

- Most people say that waste collection can be improved by doing it regularly and on time. Many feel that carelessness and lack of responsibility are major problems. People suggest keeping surroundings clean, segregating waste properly, and increasing public awareness.

- Some respondents mentioned that rural areas need more attention compared to urban areas. Others suggested strict rules and fines for throwing garbage in public places. Overall, people believe that everyone should take responsibility to keep the environment clean.

## **Step 4: Pain-Point Analysis**

1. Most of the users reporting that may increases in Mosquitoes and flies, stray animals due to irregular of waste collection, which will affect on everyone's health.
2. Poor planning and negligence is the main reason for the irregular waste collection.
3. Delayed collection causes bad smell, spread of diseases, and pollution.
4. Embarrassing of inviting the neighbor because of bad smell which is coming from the waste.
5. No proper information is given to residents about collection schedules or delays.
6. Many housewives and shop owners states that feeling anxiety and upset because the waste was not cleared.

### **Critical pain point**

Irregular waste collection leads to serious health and hygiene issues due to the accumulation of waste, increase in pests, and lack of timely communication.

## **Step 5: Root Cause Identification**

### **Symptoms vs Root Causes**

**Symptoms** Irregular waste collection leads to waste accumulation, bad odour, and

- Accumulation of garbage in residential areas
  - Bad smell and unhygienic surroundings
  - Increase in mosquitoes, flies, and stray animals
  - Stress and health issues among residents
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### **5-Why Analysis**

**Problem:** Waste is not collected regularly.

1. **Why** is waste not collected regularly?  
→ Because collection schedules are not followed properly.
2. **Why** are collection schedules not followed?  
→ Because waste collection vehicles do not arrive on time.
3. **Why** do vehicles not arrive on time?  
→ Because of vehicle breakdowns and poor route planning.
4. **Why** are there vehicle breakdowns and poor planning?  
→ Because of lack of maintenance and insufficient workforce.
5. **Why** is there lack of maintenance and workforce?  
→ Because of poor management and inadequate resource allocation.

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## **Root Cause Identified**

Poor management and inadequate allocation of resources result in irregular waste collection.

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## **Step 6: Wicked Problem Explanation**

Irregular waste collection is a wicked problem due to multiple stakeholders and interconnected issues.

### **Why it is a Wicked Problem:**

- No single solution
- Involves behavioral, technical, and administrative factors
- Solutions in one area may create problems in another

### **Output:**

Expl

Explanation of the complexity and interdependency of the problem.

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## **Step 7: Reflection Report**

This lab experiment helped me understand the real-world complexity of irregular waste collection schedules through a user-centered approach. Initially, I assumed that irregular waste collection was mainly caused by laziness of workers or minor operational delays. However, this assumption was incorrect. Through user interviews and survey responses, I realized that the issue is deeply connected to poor planning, lack of resources, inadequate communication, and weak monitoring by authorities.

User perspectives significantly changed my understanding of the problem. Residents highlighted health issues such as an increase in mosquitoes and bad odors, while shop owners and housewives expressed stress, anxiety, and embarrassment caused by accumulated waste. These insights made it clear that the problem is not only about waste collection but also about mental well-being, social discomfort, and public health. Listening to different users helped me see how one issue affects people in multiple ways.

**This lab also showed why jumping directly to solutions can be risky.** Without understanding the root causes, solutions such as adding more vehicles or workers may not be effective and could waste resources. A solution that works for one user group might create new problems for another. Therefore, proper problem analysis is essential before proposing solutions.

Through this lab, I developed several important skills. I improved my ability to observe real-world problems, collect

and analyze user data, identify pain points, and apply root cause analysis methods like the 5-Why technique. I also enhanced my communication and critical thinking skills by interpreting user feedback and reflecting on my assumptions.

Overall, this lab taught me the importance of user-centered thinking and systematic problem analysis in addressing complex public service issues.

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### **Output:**

A detailed reflection explaining incorrect assumptions, user insights, risks of premature solutions, and skills developed during the lab.