TrashTag

If you can't take it, TAG IT!

Feasibility Presentation

CS 410 Fall 2025 Team Iron

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Background

- Over the past 36 years, volunteers in the state of Virginia have removed approximately 7.1 million pounds of litter (Chesapeake Bay Foundation, 2025).
- It can take hundreds of people to to search an area for all the trash and dumping (KUT News 2023)
- Oversized items, such as mattresses, tires, and appliances, create challenges for individuals lacking equipment to haul and dispose of them safely.

Background (cont.)

- The accumulation of waste has led to approximately 100,000 marine animal deaths annually (Environmental Volunteers, 2023).
- Illegal dumping has causes an estimated drop of property values by 7% - 10% (City of Hampton, n.d.).
- Approximately 21% of beach goers report they have been injured from beach litter. (Science Direct 2016)
- When people see litter or dumping they are more likely to litter or dump more in that area. (Allegheny Front 2016)

Background (cont.)

- Litter makes tourist destinations less attractive and causes an estimated drop in revenue by 38% in areas with litter. (Keep Texas Beautiful)
- Accumulated litter can damage infrastructure, increasing maintenance and repair costs to local governments. Texas has spent $200 million in repair to wastewater systems due to trash. (Keep Texas Beautiful)
- Texas has spent $50 million in litter clean up. Costs pay for by local governments. (Keep Texas Beautiful)

Problem Statement

The communication gap that keeps trash on the map!

Independent organizations and local governments struggle to efficiently locate and remove litter in outdoor recreational areas such as parks, rivers, lakes, and beaches. Without knowing locations and characteristics of waste items, volunteer efforts can be left unprepared and ineffective. Communities lack a live reporting system to connect citizens with organizations capable of safe and efficient waste removal efforts.

Who is Affected?

Focusing on Those Impacted the Most

01

The Environment

- Open dumping landfills negatively impact the environment by contributing to pollution via toxic chemicals.
- These landfills account for at least 40% of all global waste.

02

Local Governments

- Local governments spend millions of taxpayer dollars annually on litter clean up.
- In Virginia alone, 3.5 million dollars is spent to clean the state's roadways.

03

Environmental Organizations

- Safety risks often put volunteer efforts at a significant disadvantage.
- Rising annual costs are another factor in turning away volunteers and organizations from cleaning up litter.

04

The General Public

- Excess litter creates various health hazards and diseases.
- Litter also negatively impacts waterways, communities' aesthetic value, and the cleanliness of natural areas.

Problem Characteristics

Identifying the Critical Gaps

01

Resources

- Organizations struggle to track illegal dumping.
- Items too much for individuals.
- Users and Litterers alike may or may not have adequate knowledge of proper disposal options.

02

Communication

- Users don't know who to contact regarding trash.
- Users lack tools focused on organizing cleanup efforts.
- User reports come in one at a time and require coordination within cleanup organizations to increase efficiency.

03

Convenience

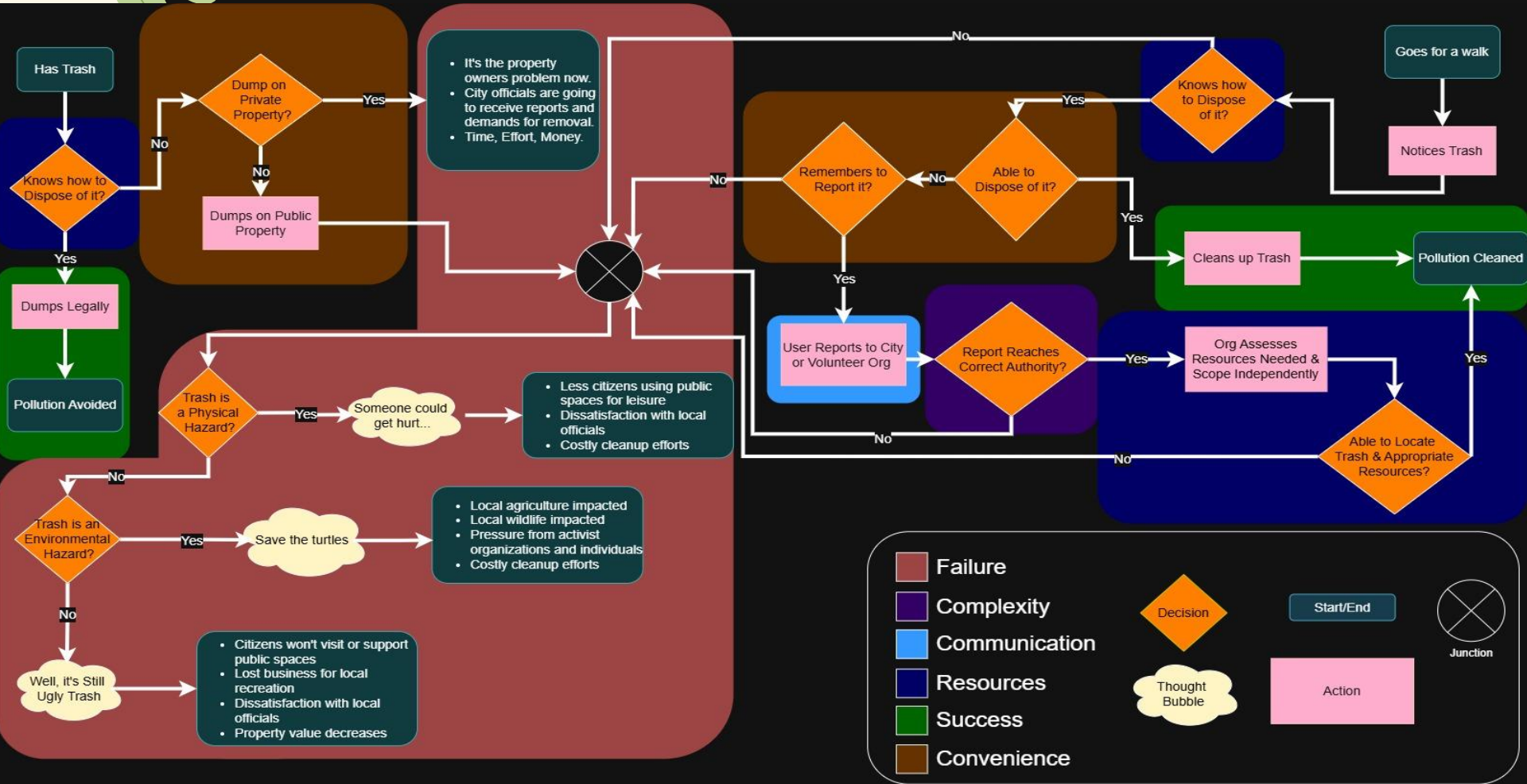
- Users can't communicate in the moment when they see the trash.
- They've forgotten by the time they return home.
- Litterers often dump out of convenience on private or public property

04

Complexity

- Users reach out to orgs via email/social media which may get lost or go unnoticed.
- Thus, users contact multiple orgs at a time to ensure attention

Current Process Flow



Solution Statement

TrashTag aims to improve the litter and waste cleanup process by developing a mobile application where users can photograph and report piles of waste, give their exact locations, and connect with cleanup groups that are well-equipped to handle the cleanup process in order to improve environmental wellbeing and preserve nature's beauty for the public eye.

We are committed to helping the environment and the public by providing a resource that clearly highlights the location, extent, type and weight of the waste as well as provides updates regarding existing cleanup efforts, dangers and geographic littering patterns to help cleanup crews allocate their time and resources more effectively.

Solution Characteristics

Live Reporting and Mapping:

- Users snap a picture of the litter and geotag it in the app for it to be uploaded to an interactive map.
- This allows organizations to properly allocate time, resources, staff, and funding.

“Litter Hero!”

- A reward system for users who successfully clear litter locations from the map.
- This allows users track their progress and notice measurable impact.

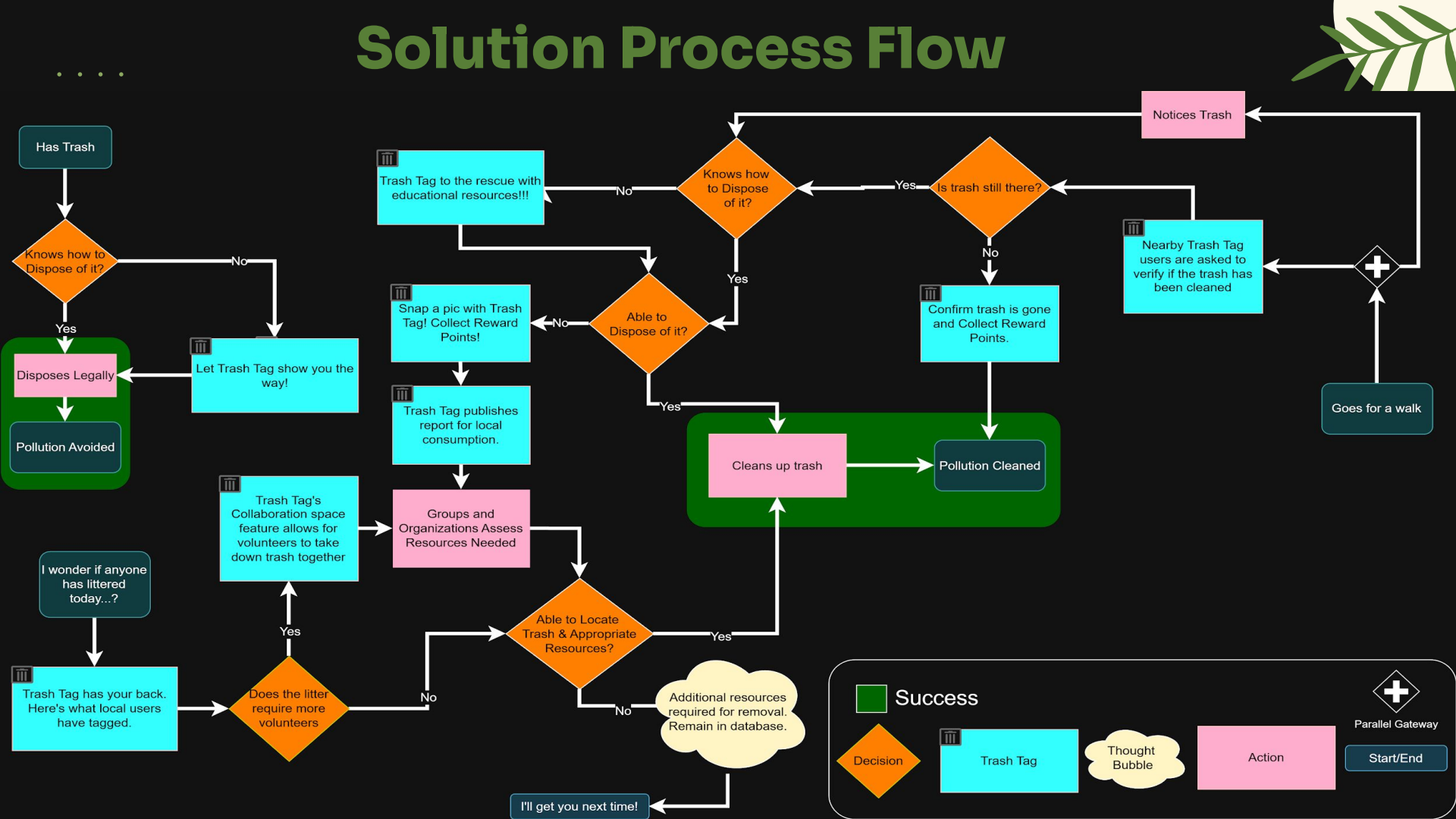
Litter Report System

- The images provide users with a visual understanding of the problem.
- This allows them to prepare resources for proper clean up.

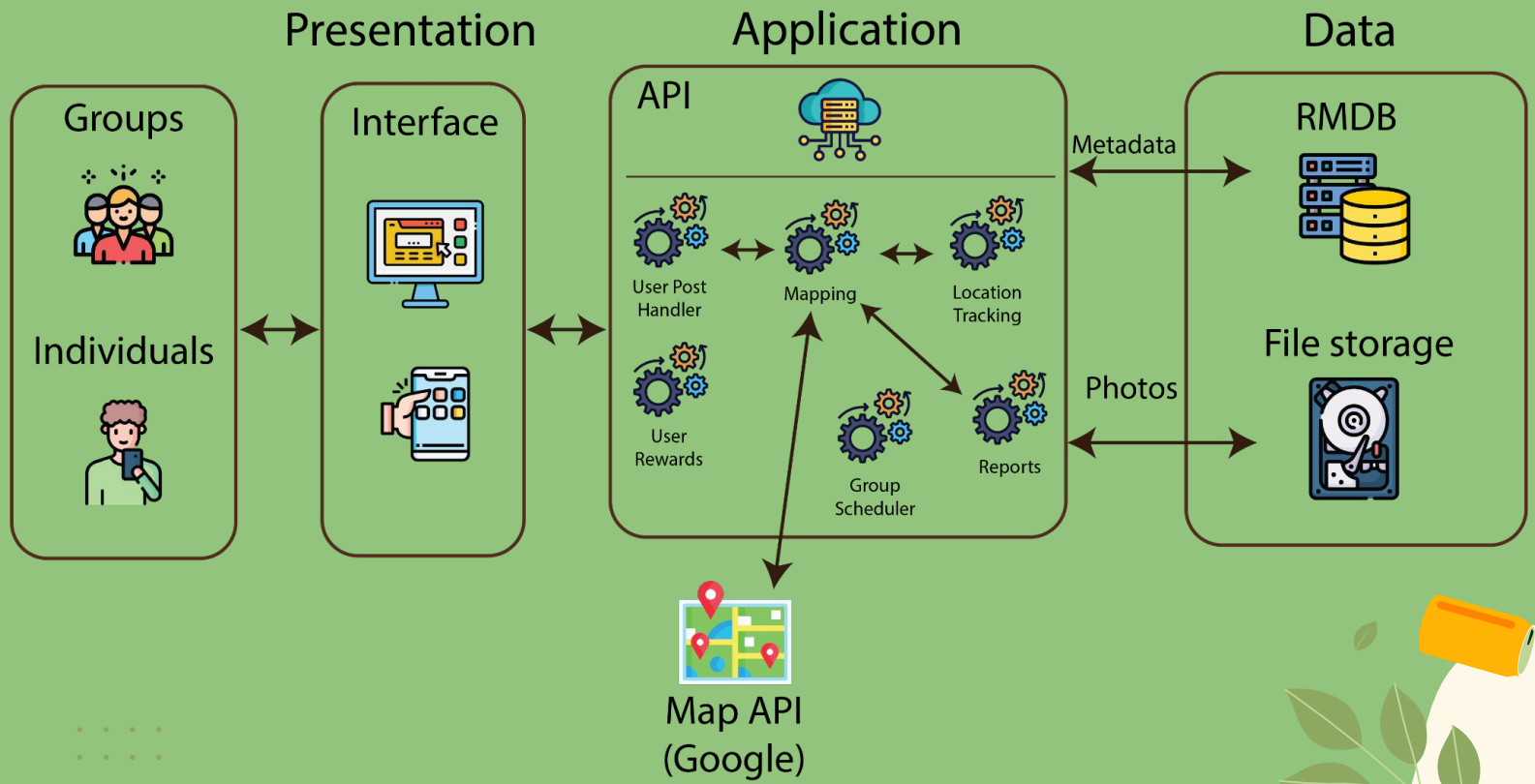
Close the loop

- When users are near reported trash they receive a request to verify the trash is still there or if its been previously cleared.

Solution Process Flow



Major Functional Component Diagram



Development Tools

Development Environment	VS Code
Version Control	Git, GitHub
Continuous Integration and Deployment	GitHub
Frontend Languages	JavaScript (React Native)
Backend Languages	C# and .NET

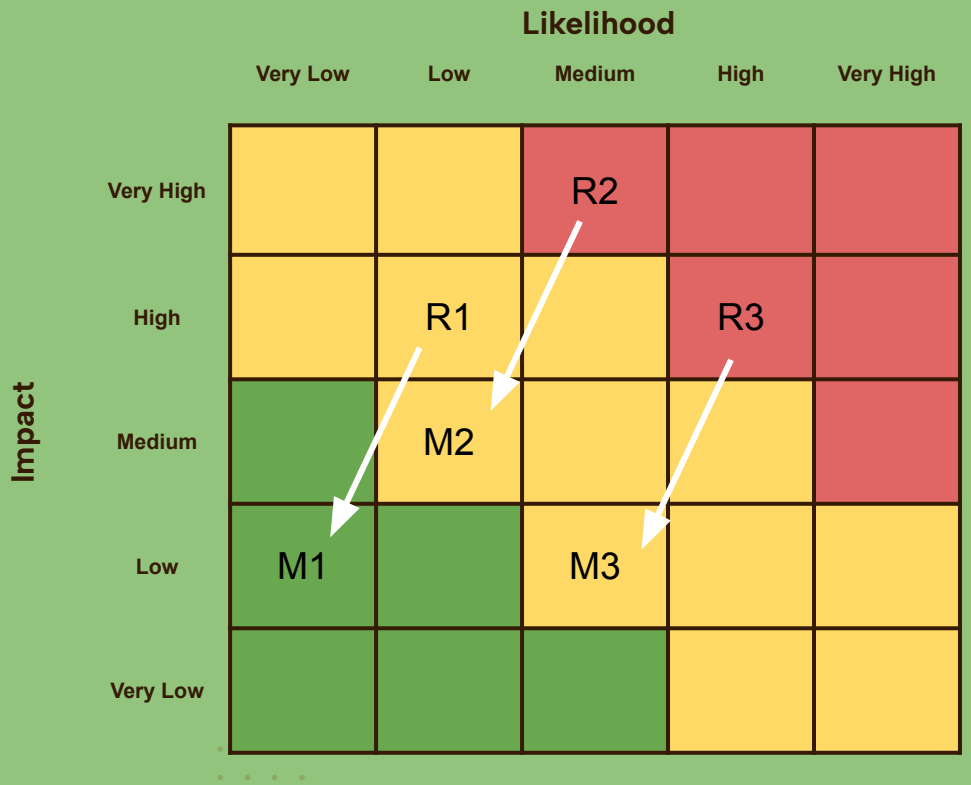
Solution Characteristics: What Will It Do?

- Live Litter Reporting and Mapping
- Ranking System for Active Report and Cleanup Users
- Updates Regarding Cleanup Efforts For Each Report
- Images of Litter for Cleanup Crews to Accurately Gauge Its Scope
- Collaboration Space for Other Users to Provide Information and Updates
- Direct Connection Between Reporters and Cleanup Crews
- Mapping Tools to Scope All Reports in a Geographic Area
- Users Receive Alerts When Near Reported Litter to Verify If It's Gone or Still There
- Scheduled Clean ups

Solution Characteristics: What Will It Not Do?

- Provide Tangible or Monetary Rewards for Active Users
- Guarantee a Cleanup Response
- Law Enforcement and Penalizing Illegal Littering
- Replace Emergency Service Reporting (e.g., chemical waste)

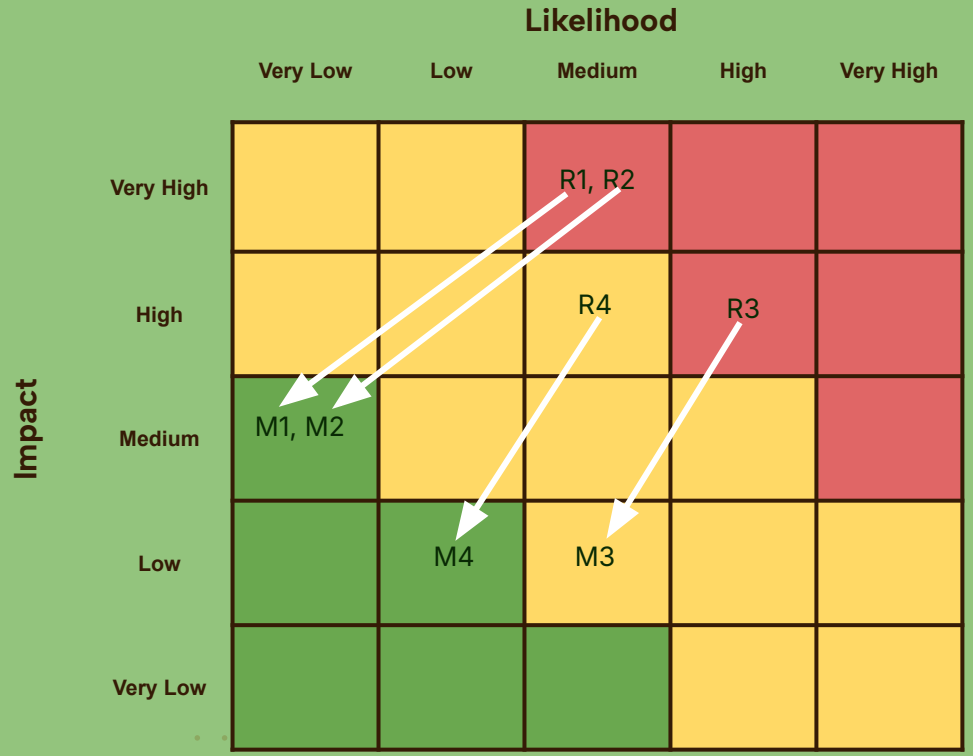
User Risks & Mitigation



R1: False entries
R2: Minimal/no clean-up organizations
R3: Minimal/no user participation

M1: Entries are verified by other users
M2: Users can organize themselves
M3: Organization outreach/advertising

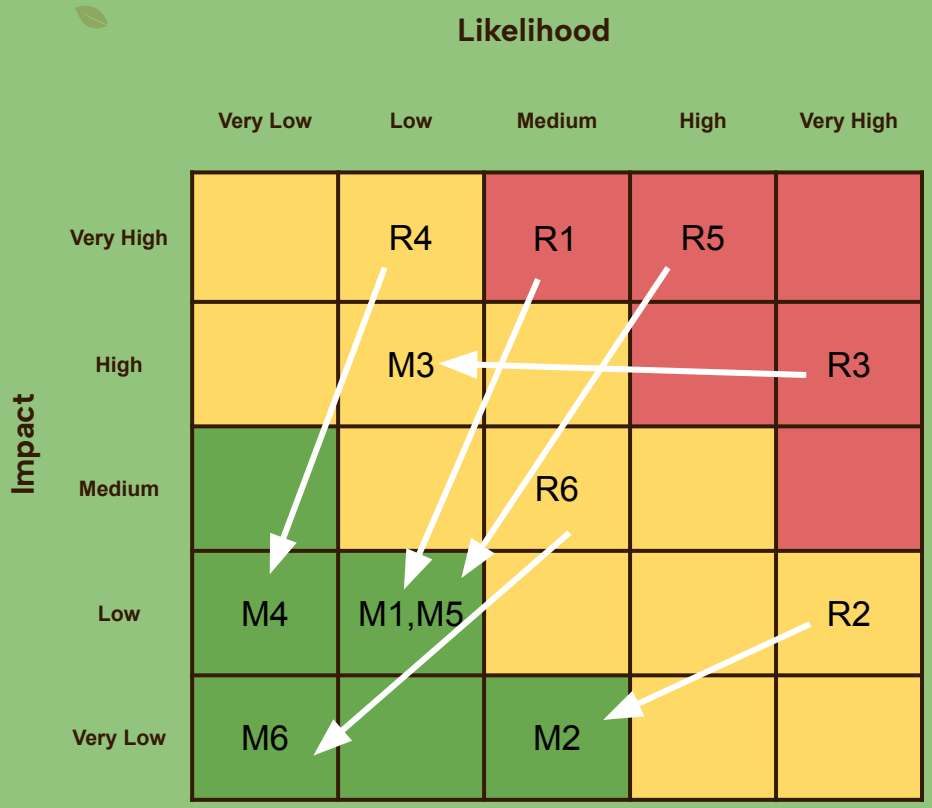
Customer Risks & Mitigation



R1: Does not integrate well with existing city/org workflows causing limited adoption
R2: Misallocation of crews due to bad/duplicate pins hurting budgets and staff morale
R3: Difficulties proving impact to local officials and donors.
R4: Budget surprises due to usage spikes and/or excessive storage needs

M1: Pilot by locale; API bridges for tailored implementation; Limit categories to not exceed capabilities
M2: Validate before dispatch recommendation; Confidence scoring; User cooldowns for inaccurate reporting
M3: Before/After photos; Outcome dashboard, Service Level Agreement (SLA) tracking
M4: Spending dashboard; Annual Total Cost of Ownership (TCO) quotes; Spending lock on non-critical features; Usage caps

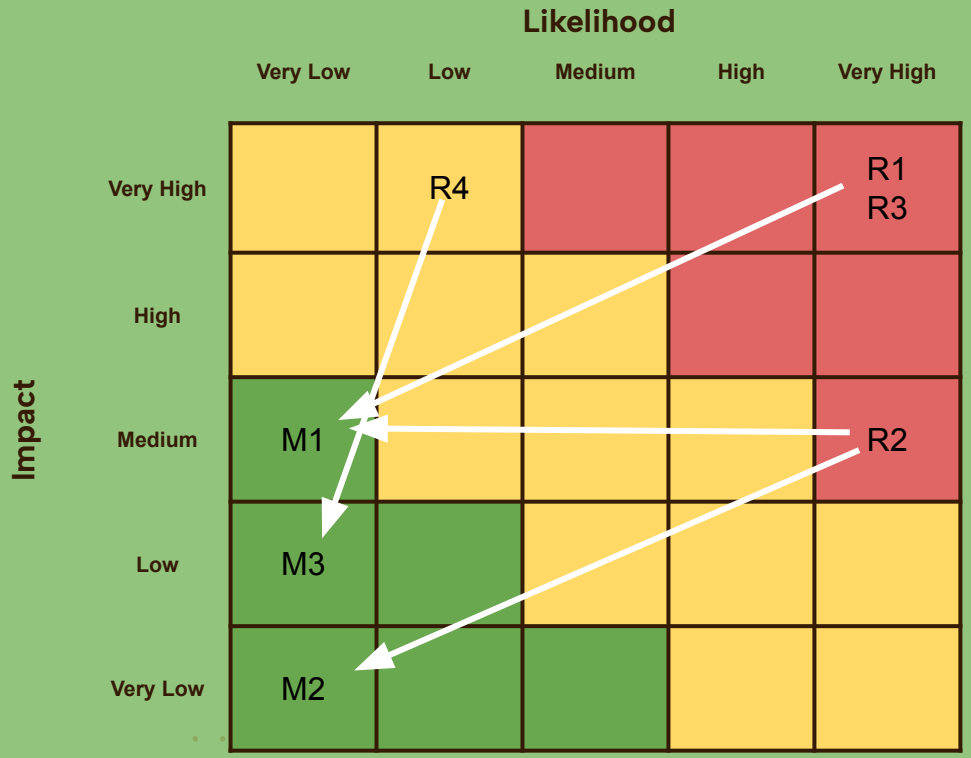
Technical Risks & Mitigation



R1: Servers are down
R2: User refuses to share location
R3: Wifi connection is lost
R4: App deletes trash that still exists
R5: App presents trash that no longer exists
R6: Individual accounts are hacked

M1: Utilize reliable hosting, a backup DNS, uptime monitoring and data backups.
M2: Clarify their location is private data that will not be shared & allow choosing location on map.
M3: Add offline data persistence & auto-sync: save posts locally & publish when connection returns.
M4: Trash report not deleted until cleaner confirms.
M5: Nearby users are asked to update trash's status. Once enough users report it's removed, it is no longer displayed in the app.
M6: Use best practices for cybersecurity & reporting

Legal & Security Risks & Mitigation



R1: Users may trespass onto private property during cleanups

R2: Users may use the platform to organize crime

R3: Users may get hurt during the cleanup

R4: A data leak would likely reveal a user's location

M1: Users will have to agree to an End-User License Agreement (EULA) to use the platform that makes clear that the platform does not assume any responsibility for any injuries or arrests obtained through use of the platform

M2: Users who violates the EULA will be banned from the platform permanently

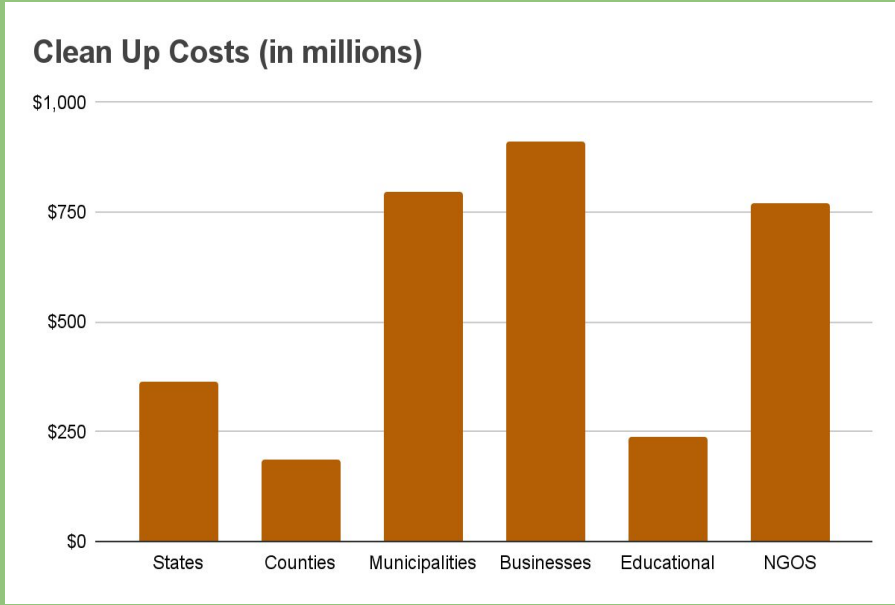
M3: User data will be encrypted to avoid data leaks revealing the location of users

Competition Matrix

Features	TrashTag	Clean Something For Nothing	Pirika	Litterati	City 311 app
Report trash	✔	✔	✔		✔
Upload Geotagged photos of trash	✔	✔	✔	✔	
Interactive map	✔	✔	✔	✔	✔
Scope Indicator	✔	✔			
Reward System	✔	✔			
Organize Groups	✔	✔		✔	
Verify Cleanup	✔				
Scheduled Cleanups	✔				
Resources on Proper Dumping	✔				✔

Benefits to Customers

- **Local Governments, Businesses, and Environmental Organizations**
  - Cut back on the amount of money spent on annual litter clean up.
  - Quickly track affected areas and efficiently organize volunteers groups to help clean these areas.



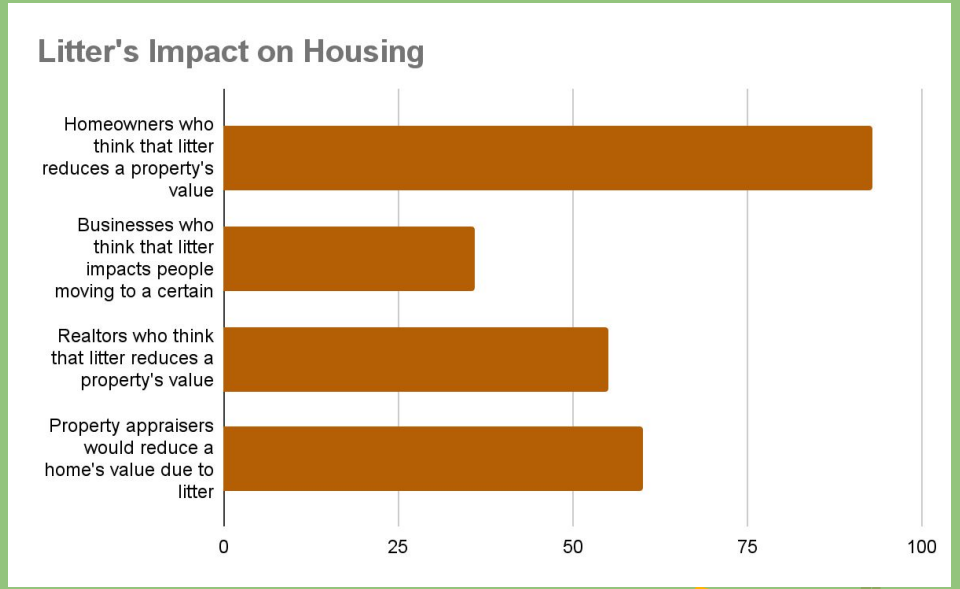
Source: Litter in America Results from the Nation's Largest Litter Study[15]

Benefits to Customers

- **Local Recreational Organizations**
  - Can coordinate via the app with users about local volunteer efforts.
  - Can use the app to locate trash within parks and recreational areas, keeping them clean and in turn helping local businesses and other parks thrive.[16]

Benefits to Customers

- **Nature Enthusiasts and Local Communities**
  - Able to connect users with likeminded people to make their communities better and raise the value of it.
  - Lets users track down trash and connect with the proper authorities if heavy equipment is required to remove it.



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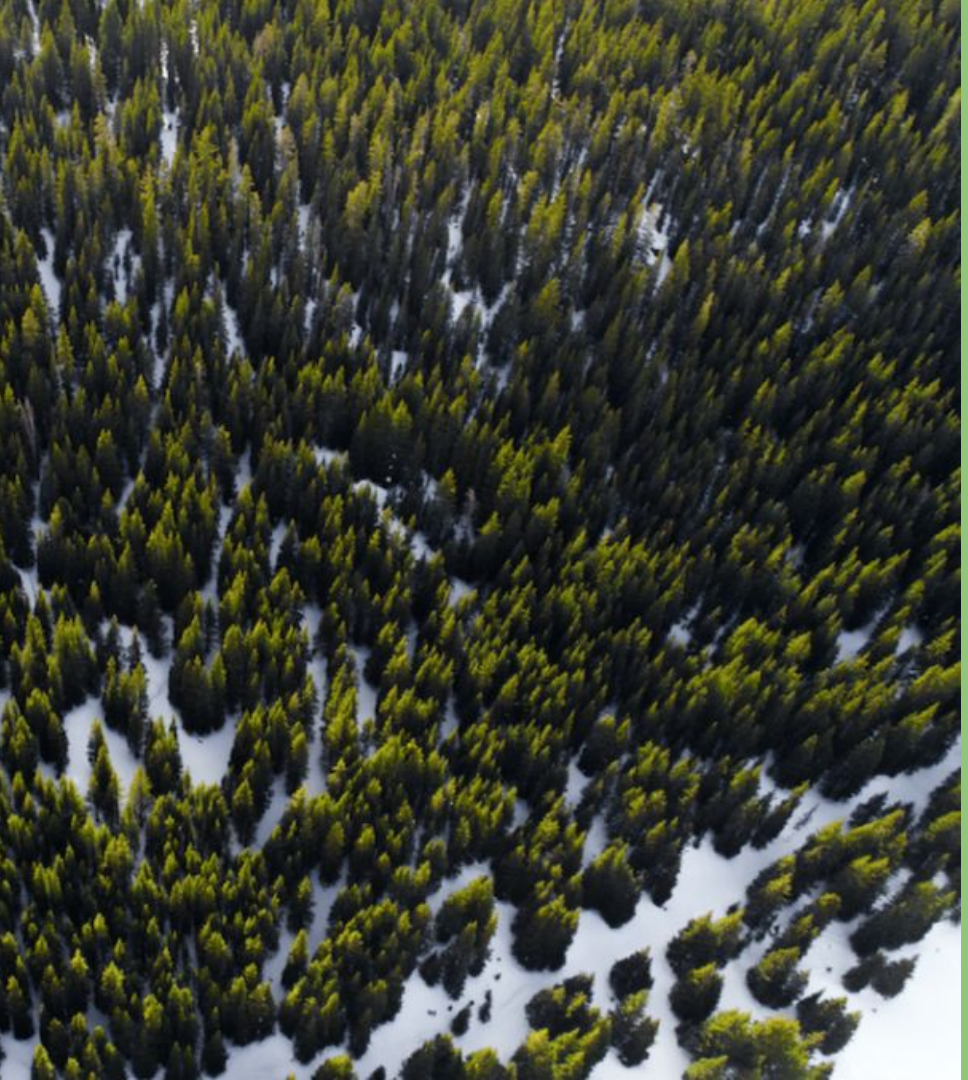

Benefits to Customers

- **Nature and the Ecosystem**
  - Makes previously littered areas more habitable for animals and plant life.
  - Benefits human health by reducing waste and landfill emissions.

Conclusion

- Littering is a continuous issue prevalent in our society that affects our environment, governments, and communities.
- **The problem**: Due to the immense communication gap between citizens who see litter and cleanup organizations equipped to remove it, these organizations waste more time searching for litter rather than investing that time removing it.
- **Our solution:** A live reporting platform that closes that gap and facilitates communication through a live mapping system.
- **Engagement**: Motivating communities to “see it, report it, and clean it” through positive engagement strategies and healthy competition
- **Our vision:** By empowering communities to report litter locations, we can successfully close that gap, allowing cleanup organizations to spend more time actively removing litter rather than wasting time searching for it. This platform will transform civic duty into an engaging community movement with our powerful platform components.

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Appendix

Application Programming Interface (API): A set of rules that allows different software programs to communicate with each other and share data or functionality.
RDBMS (Relational Database Management System): A database system that stores data in tables and organizes relationships between them.
Metadata: Data that describes other data, such as when a file was created, who created it, or what type it is.
Geotagging: The process of attaching location information to digital content, so it can be linked to a specific place on a map.