Road Assessment and Hazards (RAAH)

Group Members

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1. Introduction

Pakistan has a high rate of road hazards that disrupt urban life in the form of potholes, broken traffic lights, littering, and clogged drains. These problems not only undermine road safety, but also lower the overall quality of life for citizens. Despite being chronic, such issues are rarely reported or resolved in a timely manner due to the absence of proper communication channels between the public and municipal authorities.

To bridge this gap, Road Assessment and Hazards (RAAH) has been designed as a Human-Computer Interaction (HCI) solution. Providing a user-friendly and real-time platform, RAAH gives citizens the opportunity to report hazards with ease and authorities to respond efficiently. With features such as multi-language support, large buttons, voice assistance, and real-time notifications, RAAH ensures inclusivity, making it accessible for users of all ages and abilities.

2. Problem Statement

Road hazards such as potholes, broken traffic signals, garbage, clogged drains, and damaged streetlights are widespread in Pakistan and negatively impact both road safety and the quality of urban life. Despite their frequency, these issues are often left unresolved due to the absence of an efficient reporting and tracking mechanism. Citizens currently rely on manual complaints or outdated systems, while existing apps suffer from poor usability, lack of real-time tracking, and low adoption. This communication gap between citizens and municipal authorities results in delayed responses, accidents, traffic congestion, and public dissatisfaction.

3. Vision Statement

The vision of *Road Assessment and Hazards (RAAH)* is to develop a smart, inclusive, and responsive platform that bridges the communication gap between citizens and city authorities. By enabling transparent, real-time reporting of road issues, RAAH empowers communities to take an active role in improving road safety and urban mobility. Through verified, trackable, and data-driven reporting, RAAH envisions a proactive approach to city maintenance—creating safer roads, cleaner surroundings, and a more connected, citizen-driven urban ecosystem.

4. Persona Creation Process

To build realistic and research-based personas for the RAAH system, an eight-step development process was used. Each step ensured that the personas truly represented the behaviors, motivations, and challenges observed during surveys and interviews.

Step 1: Group Interview Subjects by Role

Participants were first organized according to their roles in society and work — citizens, engineers, traffic wardens, drivers, and municipal officers. This segmentation made it easier to identify who directly interacts with the system and who benefits indirectly from it.

Step 2: Identify Behavioral Variables

Key behavioral factors were extracted from recurring themes in the research. These included how often users encounter road issues, their comfort with technology, sense of responsibility in reporting, and preferred mode of communication.

Step 3: Map Interview Subjects to Behavioral Variables

Each participant was then matched to these variables. For instance, commuters and students showed high tech adoption but limited patience for long forms, while officers displayed stronger needs for accuracy, coordination, and data monitoring.

Step 4: Identify Significant Behavior Patterns

From this mapping, clear clusters of behavior emerged such as Active Reporters, Passive Observers, Data-Driven Planners, and Authority Monitors. Each group represented a unique way of engaging with road-safety management.

Step 5: Synthesize Characteristics and Define Goals

Common goals within each cluster were identified. Commuters wanted quick and simple reporting, officers focused on efficient prioritization, and citizens valued visible results and transparency from authorities.

Step 6: Check for Redundancy and Completeness

Similar personas were merged to remove overlap, while distinct ones like engineers and municipal officers were kept separate. This ensured a well-rounded representation of all user categories involved with RAAH.

Step 7: Designate Persona Types

Based on their involvement and interaction with RAAH, personas were categorized as:

Primary Personas: End users like commuters and professionals

Secondary Personas: Municipal officers and civil engineers

Supplementary Personas: Drivers and traffic wardens

Customer Persona: City Authority Administrator

Served Persona: Citizens indirectly benefiting

Negative Persona: Users misusing or disengaging with the system

Step 8: Expand Description of Attributes and Behaviors

Finally, each persona was described in depth, including their background, goals, skills, and frustrations. Realistic scenarios were crafted to illustrate how RAAH affects their daily experiences and decision-making.

4.1. Personas

- **Primary Persona (P-01)**

PERSONA: Faizan Sheikh

NAME

Faizan Sheikh

MARKET SIZE

30 %

TYPE

Primary Persona

Goals

- Report road hazards quickly and easily without needing to call or visit authorities.
- Stay informed about road conditions (like potholes or signal failures) before leaving home.
- Track complaint progress transparently, ensuring issues he reports are actually resolved.

Quote

Every day there's a new pothole, but no one seems to care — I wish reporting it was easier

Demographic

♂ Male 26 years

University Student

Background

Faizan is a university student who commutes daily across busy city roads.
He's tech-savvy, active on social media, and relies heavily on apps like Google Maps and Careem. He cares about civic improvement but feels traditional reporting systems are slow and ineffective.

Skills

Smartphone Literacy

0 25 50 75 100

App Navigation

0 25 50 75 100

Problem Reporting Awareness

0 25 50 75 100

Civic Responsibility

0 25 50 75 100

Motivations

- Wants to make commuting safer for himself and others.
- Feels empowered when authorities respond to his reports.
- Values transparency and real-time updates.

Frustrations

- Reporting issues takes too long and rarely gets results.
- Repeated exposure to the same road hazards daily.
- No way to track whether a complaint was ever fixed.

Technology

Expectations

- Quick photo-based reporting with GPS tagging.
- Real-time updates on complaint progress.
- Option to view resolved or pending issues nearby.

UXPRESSIA

This persona was built in uxpressia.com

- **Primary Persona (P-02)**

PERSONA: Fatima Malik

NAME

Fatima Malik

MARKET SIZE

20 %

TYPE

Primary Persona

Goals

- Reduce daily commute delays caused by blocked drains, garbage, or broken signals.
- Receive real-time notifications about road repairs or maintenance updates along her route.
- Use RAAH as a reliable reporting tool to feel more empowered as a citizen.

Quote

If I could just report broken signals or flooded roads from my phone, it would save so much stress.

Demographic

Female 33 years

Bank Employee

Background

Fatima is a bank employee who spends hours commuting daily.
She is responsible and organized, balancing work and family life. She values time, safety, and environmental cleanliness, and expects efficiency from city systems.

Skills

Mobile App Proficiency

0 25 50 75 100

Reporting Skills

0 25 50 75 100

Awareness of City Systems

0 25 50 75 100

Digital Trust in Govt. Tools

0 25 50 75 100

Motivations

- Wants to reduce commute delays caused by poor infrastructure.
- Cares about city cleanliness and a healthy environment for her children.
- Appreciates simple, functional digital tools that save time.

Frustrations

- Roads often blocked or flooded, especially during rain.
- No direct or quick way to report maintenance problems.
- Feels helpless when the same issues persist for weeks.

Technology

Expectations

- Receive alerts about road conditions and repairs.
- Submit and track reports easily with pictures and location.
- Experience faster, visible action from city management.

UXPRESSIA

This persona was built in uxpressia.com

- **Secondary Persona (P-03)**

PERSONA: Sana Iqbal

NAME

Sana Iqbal

MARKET SIZE

10 %

TYPE

Secondary Persona

Goals

- Identify high-risk zones efficiently using organized citizen reports from RAAH.
- Prioritize repair and maintenance work based on complaint frequency and severity.
- Measure team performance and response times through dashboard analytics.

Quote

If citizens report accurately, we can prioritize repairs and manage the city better.

Demographic

Female 38 years

Municipal Officer

Background

Sana works as an Urban Planning Coordinator in the municipal department. She supervises cleanliness, drainage, and lighting projects in residential areas. Her job involves monitoring reports, planning repair schedules, and managing maintenance teams.

Skills

Report Handling

0 25 50 75 100

Decision Making

0 25 50 75 100

Communication with Citizens

0 25 50 75 100

Tech Adoption

0 25 50 75 100

Motivations

- Wants accurate, real-time data to plan maintenance effectively.
- Strives to improve departmental efficiency and transparency.
- Aims to strengthen trust between the public and government.
- Values structured dashboards and measurable progress.

Frustrations

- Relies on outdated manual reports from field workers.
- Lacks reliable tools to track issue locations or status.
- Faces communication gaps between teams and citizens.
- Overloaded with unorganized or duplicate complaints.

Technology

Expectations

- Dashboard for viewing and filtering citizen reports.
- Data visualization for decision-making and progress tracking.
- Reduce manual reporting workload and improve response time.

UXPRESSIA

This persona was built in uxpressia.com

- **Secondary Persona (P-04)**

PERSONA: Kamran Ansari

NAME

Kamran Ansari

MARKET SIZE

10 %

TYPE

Secondary Persona

Goals

- Prioritizes critical road repairs for efficiency.
- Minimizes manual work through digital reporting.
- Tracks repair progress with real-time updates.
- Allocates resources effectively using data insights.

Quote

There is often a lack of communication between government departments regarding the fund execution procedure.

Demographic

Male 42 years

Civil Engineer

Background

Kamran Ansari works in the Road Maintenance Department, where he oversees repair projects and coordinates with multiple government departments. He often faces delays due to manual citizen reports and poor interdepartmental communication regarding fund execution.

Skills

Data Handling

0 25 50 75 100

System Management Skills

0 25 50 75 100

Digital Collaboration

0 25 50 75 100

User Empathy

0 25 50 75 100

Motivations

- He wants a central system for citizen reports.
- The reports should be accurate and location-tagged.

Frustrations

- He often receives incomplete or fake reports.
- He struggles to prioritize genuine repairs effectively.

Technology

Expectations

- Timely reporting of road hazards from users and delivery riders.
- Real-time tracking of ongoing maintenance for better oversight.

UXPRESSIA

This persona was built in uxpressia.com

- **Supplementary Persona (P-05)**

PERSONA: Haider Malik

NAME

Haider Malik

MARKET SIZE

12 %

TYPE

Supplementary Persona

Goals

- Report road problems quickly using the app.
- Receive real-time updates about road conditions.
- Reduce vehicle repair costs through safer routes.

Quote

The app would make things smoother. Drivers could plan routes better and avoid problem areas — saving time and fuel.

Background

Haider is a delivery rider who drives daily across Lahore for work and studies. He often faces rough and uneven roads, especially near Canal View and Thokar, where waterlogging makes driving risky.

Demographic

♂ Male | 29 years

Delivery Rider

Motivations

- He wants early alerts about road issues.
- He also prefers quick resolutions for smoother navigation.

Frustrations

- He has encountered potholes and roadblocks frequently.
- He loses income when routes are disrupted.

Skills

GPS & Navigation tools

0 25 50 75 100

Mobile Usage while working

0 25 50 75 100

Reporting road issues

0 25 50 75 100

Route Planning

0 25 50 75 100

Technology

Expectations

- Quickly and easily report road hazards while driving safely.
- Receive real-time updates and notifications on problem areas.

UXPRESSIA

This persona was built in uxpressia.com

- **Supplementary Persona (P-06)**

PERSONA: Javed Mirza

NAME

Javed Mirza

MARKET SIZE

8 %

TYPE

Supplementary Persona

Demographic

♂ Male | 36 years

Traffic Police Officer

Skills

Hazard Detection

0 25 50 75 100

Digital Reporting (via Mobile)

0 25 50 75 100

Team Coordination

0 25 50 75 100

Tech Literacy

0 25 50 75 100

Goals

- Maintains safe and smooth traffic flow daily.
- Identifies and reports road hazards quickly.
- Coordinates with other authorities for safety.

Quote

"The app would help a lot. We could manage traffic better if we knew when or where the repair work is happening. Right now, we just get sudden orders on wireless — no advance updates."

Background

Javed is a traffic warden managing busy areas like Mall Road and Jail Road. He often handles traffic near damaged roads, potholes, and waterlogged spots. Communication is mostly through wireless or phone, and repairs usually take time.

Motivations

- He wants to share real-time road hazard alerts.
- He aims to inform both authorities and drivers directly.

Frustrations

- There is no proper system to alert citizens.
- Repairs are not coordinated or completed quickly.

Technology

Expectations

- Coordinate traffic management efficiently during hazards.
- Ensure timely response from authorities and teams.

UXPRESSIA

This persona was built in uxpressia.com

- **Customer Persona (P-07)**

PERSONA: Ahmed Raza

NAME

Ahmed Raza

MARKET SIZE

2 %

TYPE

Customer Persona

Demographic

♂ Male | 38 | years

Senior Officer, Lahore Municipal Corporation (LMC)

Skills

Administrative Planning

0 25 50 75 100

Data Analysis & Tracking

0 25 50 75 100

Public Communication

0 25 50 75 100

Technology Integration

0 25 50 75 100

Goals

- Improve coordination among departments for faster issue resolution.
- Ensure verified, location-accurate citizen reports to minimize false claims.
- Enhance transparency and build citizen trust in municipal response systems.
- Use real-time data analytics to allocate maintenance teams efficiently.
- Digitally monitor staff performance and reporting trends city-wide.

Quote

Our biggest challenge is trust; we need citizens to see that their voices lead to real action.

Background

Ahmed Raza has worked in the municipal operations department for over a decade, overseeing road repair, drainage, and waste management teams. His role requires coordinating between different departments; engineering, traffic control, and sanitation; often through outdated communication channels.
He's familiar with administrative dashboards and digital report systems but struggles with data coming from unreliable sources or missing verification. Ahmed represents the *customer persona* who would use **RAAH's authority dashboard** to manage, verify, and prioritize citizen reports.

Motivations

- Improve Lahore's urban infrastructure efficiency.
- Showcase measurable civic improvement through data-driven actions.
- Reduce manual dependency and paperwork in municipal reporting.

Frustrations

- Duplicate or fake citizen reports waste manpower.
- Delayed inter-department coordination slows down repairs.
- Limited visibility on whether resolved issues remain fixed long-term.

Technology

Expectations

- Expects a reliable, data-driven system that verifies citizen reports automatically and displays real-time progress.
- Wants seamless coordination between departments through a centralized digital dashboard.

UXPRESSIA

This persona was built in uxpressia.com

- **Served Persona (P-08)**

PERSONA: Sara Khan

NAME

Sara Khan

MARKET SIZE

7 %

TYPE

Served Persona

Demographic

Female 29 years

Marketing Executive

Skills

Mobile App Usage

0 25 50 75 100

Navigation & Geo-tagging

0 25 50 75 100

Digital Communication

0 25 50 75 100

Complaint Tracking

0 25 50 75 100

Goals

- To live in a cleaner, safer neighborhood where road issues are addressed in a timely manner.
- To feel confident that when someone in her community reports a problem, it will actually be resolved.
- To experience smooth daily mobility (walking/driving) without disruption or hazards.
- To trust that the local authorities care about public well-being.

Quote

I'd love to report issues if I knew someone would actually fix them.

Background

Sara lives in a residential neighborhood and cares deeply about keeping her surroundings clean and safe for her family. She often notices issues like garbage buildup or stagnant water on streets but does not usually report them herself; either because she doesn't know how or doesn't feel confident that it will make a difference. Instead, she relies on community WhatsApp groups and neighbors who are more active in reporting problems.
Her experience improves only when others report issues and authorities respond, making her an indirect beneficiary of the RAAH system.

Motivations

- She wants her family to feel safe and comfortable when moving around the neighborhood.
- She values a well-maintained environment as part of community dignity and quality of life.
- She appreciates seeing visible improvements because it restores her trust in public services.
- She feels reassured when authorities respond promptly; it signals respect and accountability.

Frustrations

- Feels helpless when issues like garbage buildup or potholes are ignored for a long time.
- Gets frustrated when complaints shared in community groups receive no municipal follow-up.
- Loses trust when authorities fix issues only temporarily or selectively.

Expectations

- Expects a simple, bilingual app that lets her report road issues quickly and get timely updates.
- Wants visible proof that her complaint leads to real improvements in her area.

Technology

UXPRESSIA

This persona was built in uxpressia.com

- **Negative Persona (P-09)**

PERSONA: Bilal Siddiqui

NAME

Bilal Siddiqui

MARKET SIZE

1 %

TYPE

Negative Persona

Goals

- Express frustration quickly without expecting long-term results.
- Gain quick attention for personal grievances.
- Occasionally test digital systems or share random feedback.

Quote

If I don't see results soon, I just uninstall the app.

Demographic

♂ Male 24 years

Student

Background

Bilal is a university student who rides his motorbike across different areas for part-time delivery work. While he's tech-savvy and uses several mobile apps, he doesn't take reporting systems seriously. Occasionally, he posts inaccurate complaints or abandons reports mid-way due to lack of interest or delayed feedback.

Skills

Mobile App Familiarity

0 25 50 75 100

Digital Reporting Accuracy

0 25 50 75 100

Follow-up and Engagement

0 25 50 75 100

Social Media Usage

0 25 50 75 100

Motivations

- Seeks quick acknowledgment or rewards.
- Enjoys exploring new apps but loses interest fast.
- Uses platforms more for convenience than responsibility.

Frustrations

- Gets impatient when authorities don't respond immediately.
- Believes his reports won't make a difference.
- Loses trust if he doesn't see visible results fast.

Technology

Expectations

- Expects quick responses or instant rewards after submitting a report.
- Loses interest if results or acknowledgments are delayed.

UXPRESSIA

This persona was built in uxpressia.com

5. Behavior–Persona Mapping

Persona	Observed Behavior
P-01	Frequently uses digital apps for navigation and services; reports being frustrated by unresponsive authorities.
P-02	Time-conscious and prefers organized tools; checks apps only during commute.
P-03	Regularly checks reports in bulk; prefers dashboards over manual lists.
P-04	Relies on manual reporting and slow coordination, which affects timely planning and repair execution.
P-05	Encounters poor road conditions daily and prefers simple digital tools to navigate safely and stay on time.
P-06	Handles traffic around damaged areas and reports issues manually, often facing safety risks and delayed responses.
P-07	Reviews reports in bulk, prefers structured dashboards over manual logs, and relies on clear visual evidence before approving maintenance work.
P-08	Uses mobile apps daily and prefers simple, clean UI; only continues using an app if she sees visible results and acknowledgment from authorities.
P-09	Capable of using digital apps but shows low responsibility; submits incomplete or incorrect data and loses interest when results are not instant.

6. Context Scenarios

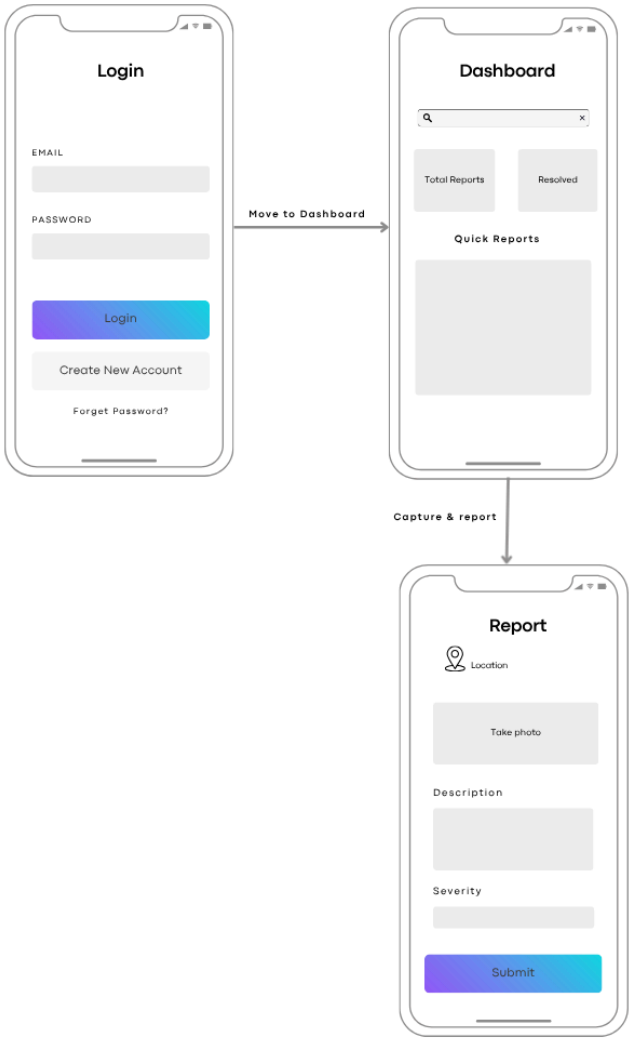
- ## Scenario (S-01)

Title: Morning Commute & Quick Hazard Reporting

Faizan **(P-01)** rushes out early for his morning university classes. He uses Google Maps to check the fastest route, but as usual, he hits a massive pothole near the bus stop. His bus slows down, and everyone grumbles. Faizan opens the Road Assessment app because it's super easy to use. He snaps a photo of the pothole, lets

the app auto-detect the location, and submits the report in less than ten seconds. As he gets back to scrolling Instagram, he feels a little relief knowing he contributed to making this route better for everyone who travels daily.

Visual Representation:



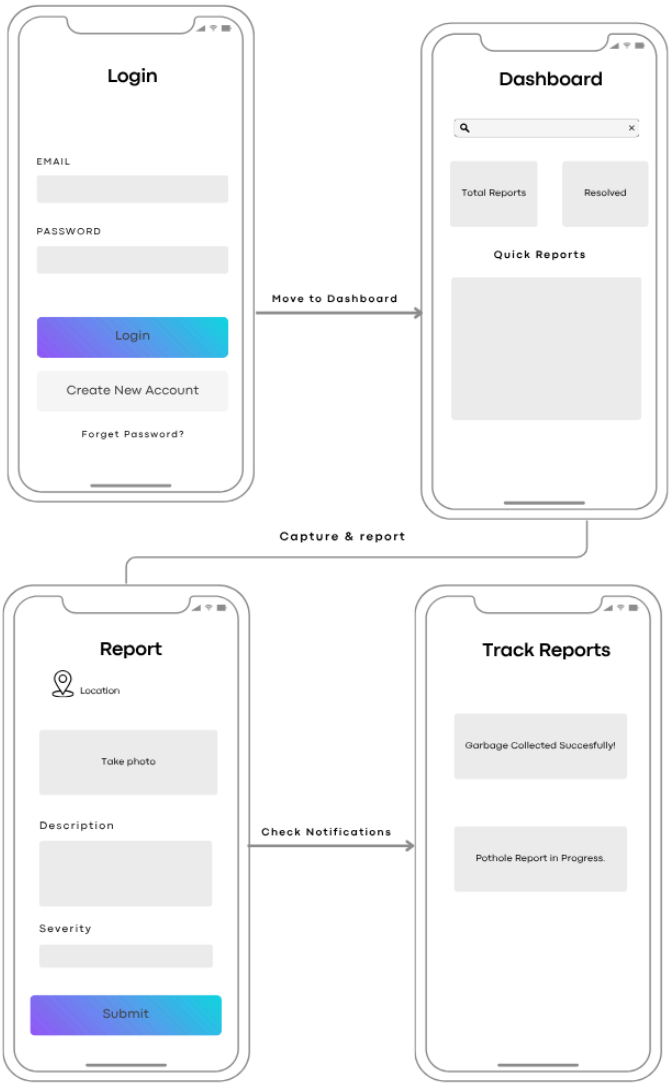
- ## Scenario (S-02)

Title: Cleanliness Concerns on School Routes

Fatima **(P-02)** notices a pile of garbage near her children's school. She hates how this affects their environment. During her lunch break, she opens the app, snaps a photo of the garbage spot, and submits the issue with a quick category tag. The clean interface makes it effortless. A few days later, she sees a notification that the cleaning

team handled it. She feels reassured knowing she can take action that keeps her family's surroundings cleaner and safer.

Visual Representation:



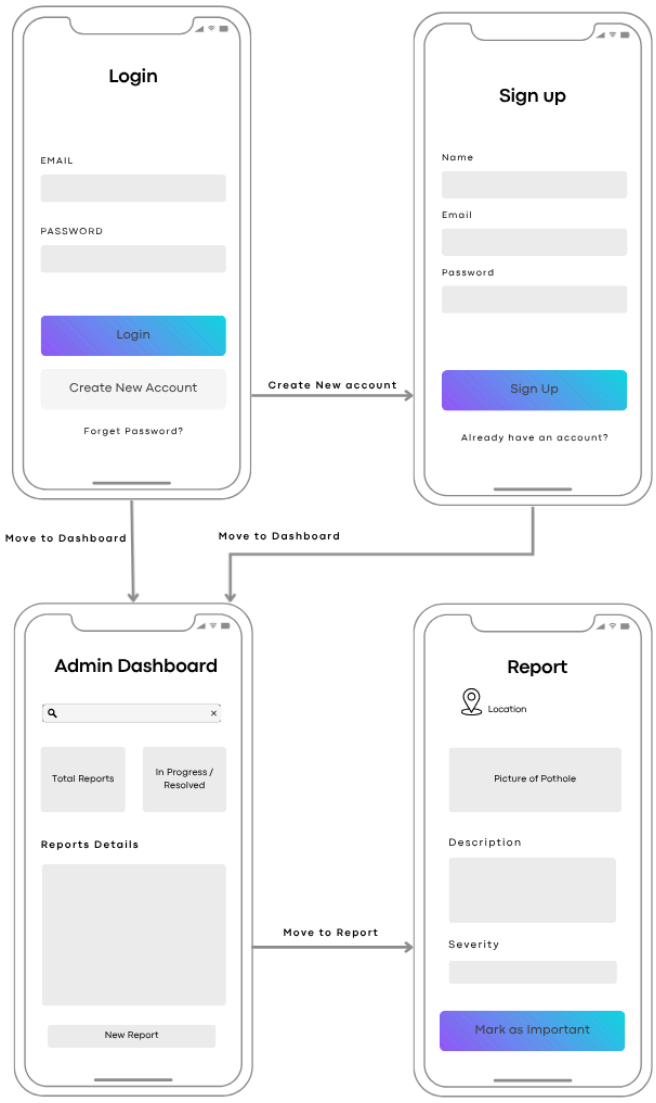
- ## Scenario (S-03)

Title: Real-Time Road Insights for Better Planning

Sana **(P-03)** sits at her office reviewing maintenance plans for residential sectors. Before this app, she relied only on complaints forwarded by staff or old manual reports. She opens the Road Assessment dashboard and sees updated heatmap data highlighting areas with high reports of broken streetlights and potholes. The clarity

helps her prioritize which neighborhoods need immediate repairs. She schedules teams accordingly with confidence rather than assumptions.

Visual Representation:



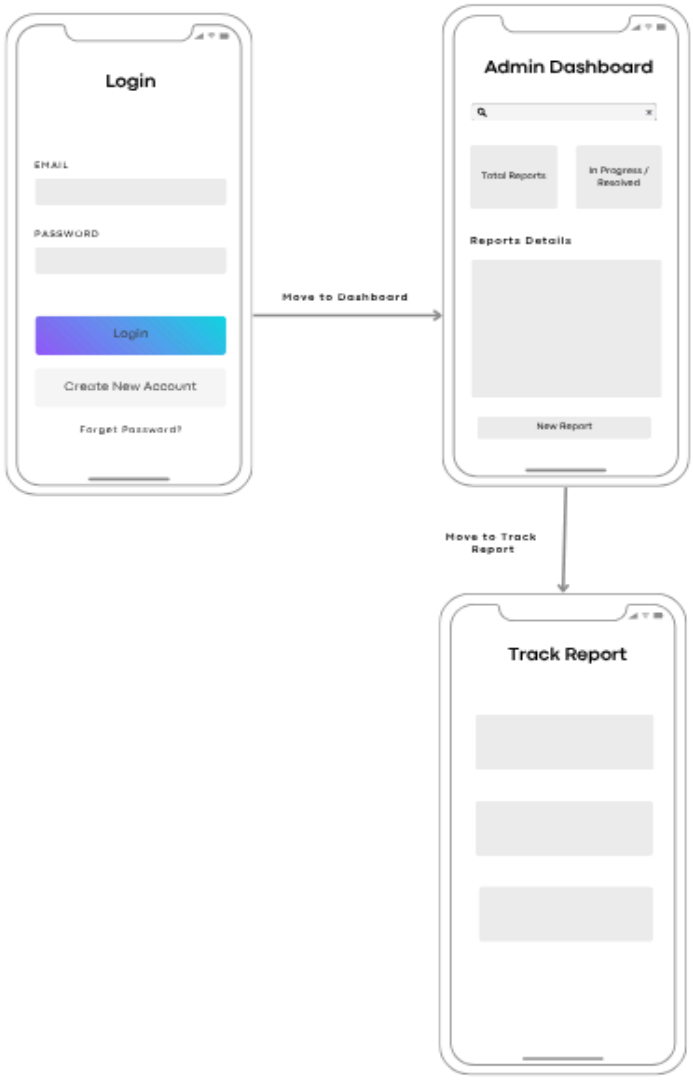
- **Scenario (S-04)**

Title: Data-Driven Repair Coordination

Kamran **(P-04)** logs into the RAAH dashboard each morning to review verified citizen reports and field updates. Before this system, he depended on delayed manual reports and phone calls from different departments. Now, with real-time visuals and location-based data, he identifies high-risk zones and prioritizes urgent repairs. The

digital transparency helps him allocate resources efficiently and justify decisions during coordination meetings.

Visual Representation:

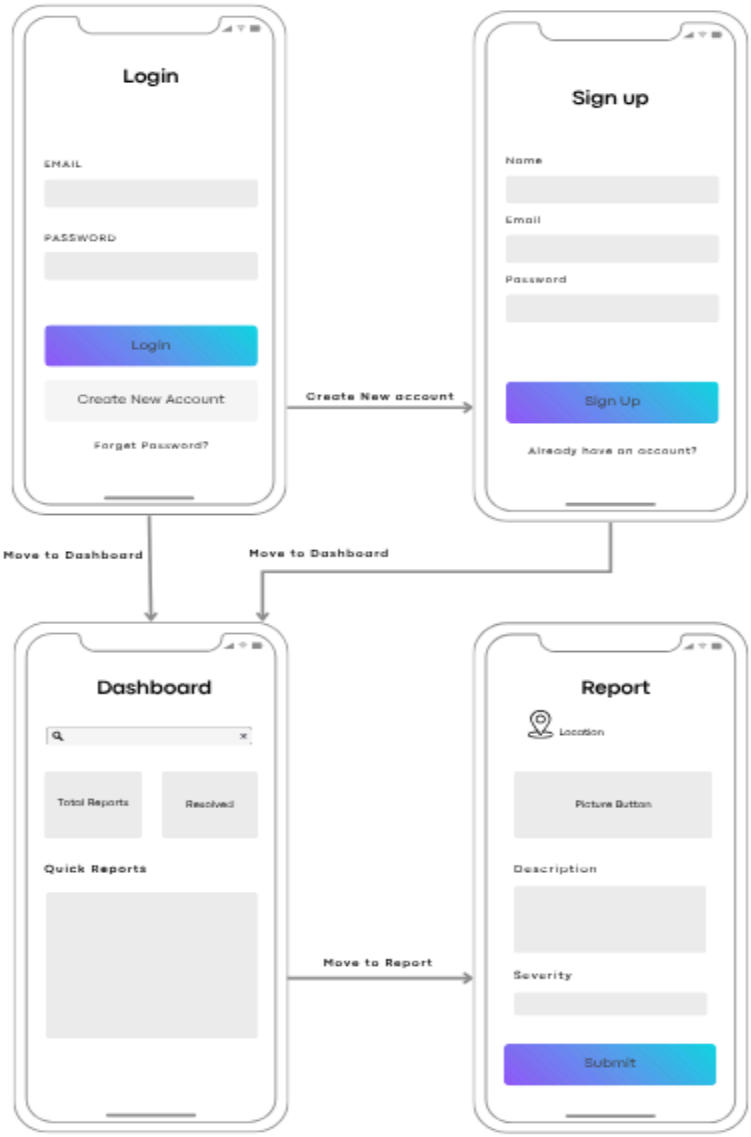


- ## Scenario (S-05)

Title: Navigating Safer Routes

Haider **(P-05)** begins his day by opening the RAAH app to view updated maps showing flooded areas or damaged roads. Previously, he discovered hazards the hard way losing time and fuel while rerouting mid-delivery. With RAAH, he can avoid risky roads, report new issues within seconds, and stay informed about active repairs. This helps him complete deliveries faster and drive more safely through the city.

Visual Representation:

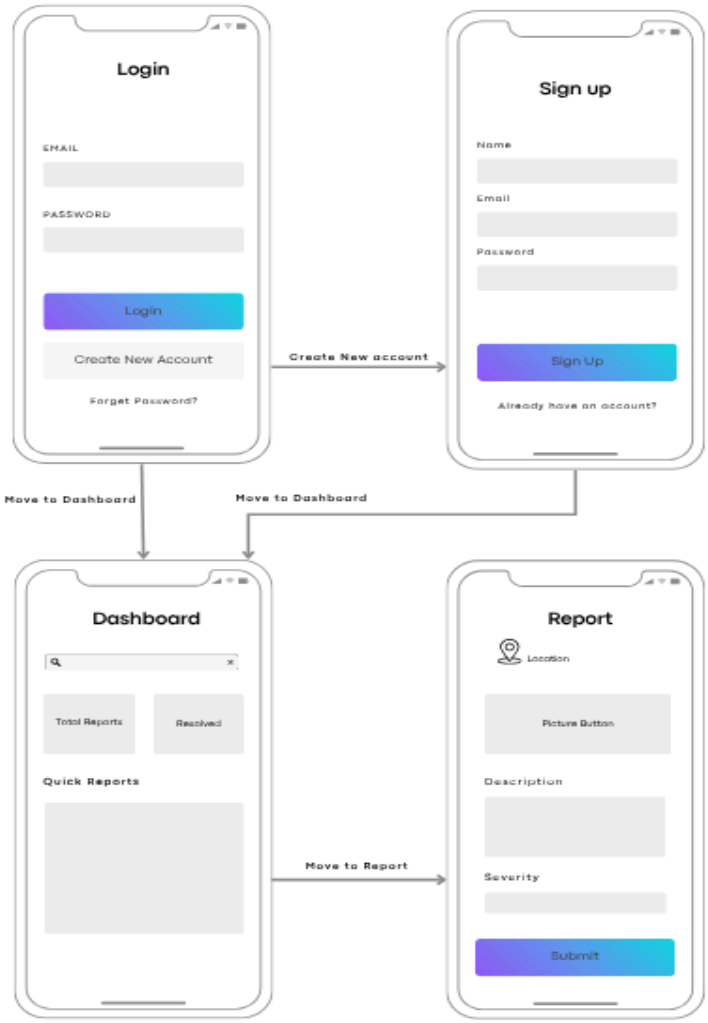


- **Scenario (S-06)**

Title: Managing Hazards On-Site

Javed **(P-06)** starts his shift by checking the RAAH alerts for any reported road hazards or ongoing repairs. Earlier, he only received sudden wireless orders with no prior updates. Now, the dashboard notifies him about potholes or signal failures in advance, allowing him to plan his route and manage traffic smoothly. When he encounters new hazards, he instantly uploads a photo and location to alert both drivers and authorities.

Visual Representation:

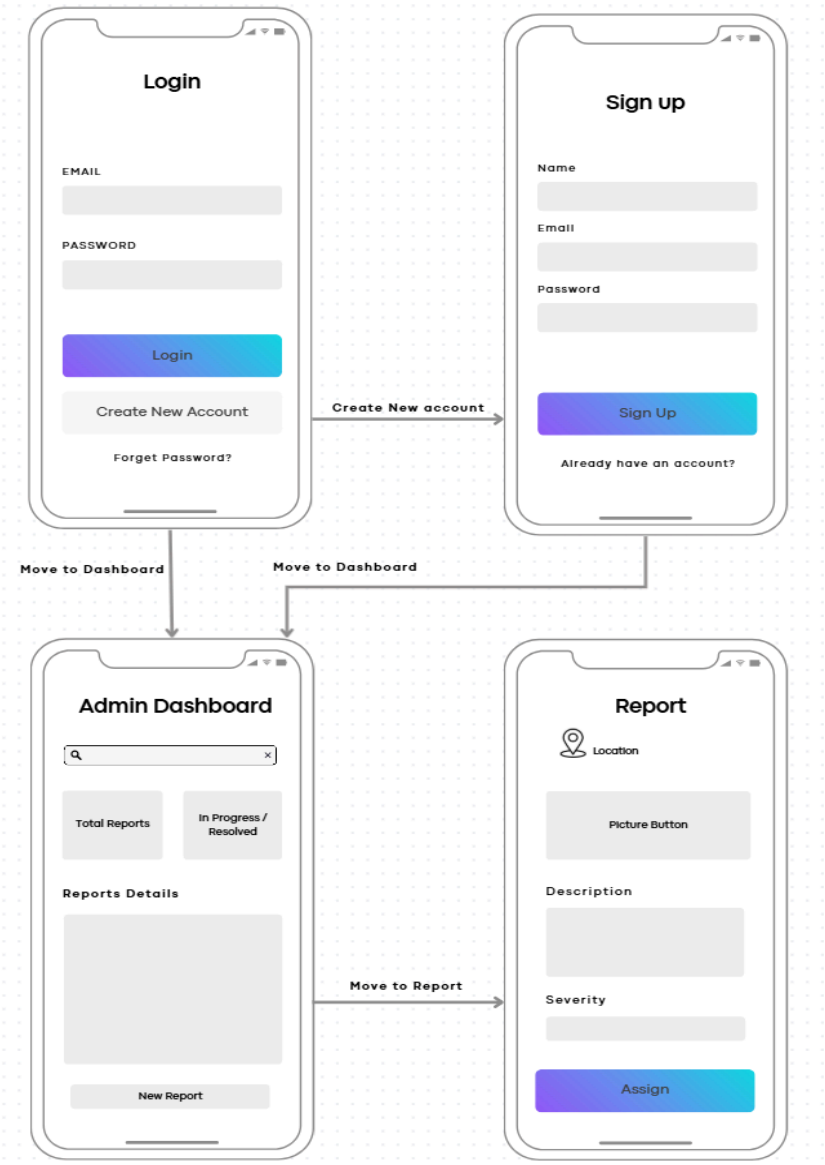


- **Scenario (S-07)**

Title: Authority Reviewing & Assigning Tasks

Ahmed **(P-07)** logs into the RAAH dashboard every morning to review citizen complaints. He filters by urgency and locality, checks photo verification, and then assigns tasks to field units. When multiple reports come from the same location, he marks it as priority and generates a repair order. Clear digital records help him justify funding and staffing decisions during weekly review meetings.

Visual Representation:



- **Scenario (S-08)**

Title: Resident Reports a Neighborhood Issue

Sara **(P-08)** is walking back from dropping her kids at school when she notices garbage piling up near the street corner. The smell is bad and people are avoiding the sidewalk. One of her neighbors takes a photo and reports it through the RAAH app. The next day, Sara sees a municipal cleaning team working on the same spot. The walkway is clear again, and the unpleasant smell is gone. Seeing the issue resolved **without her needing to take action** reassures her that community reporting actually works and that the authorities are paying attention.

Visual Representation:

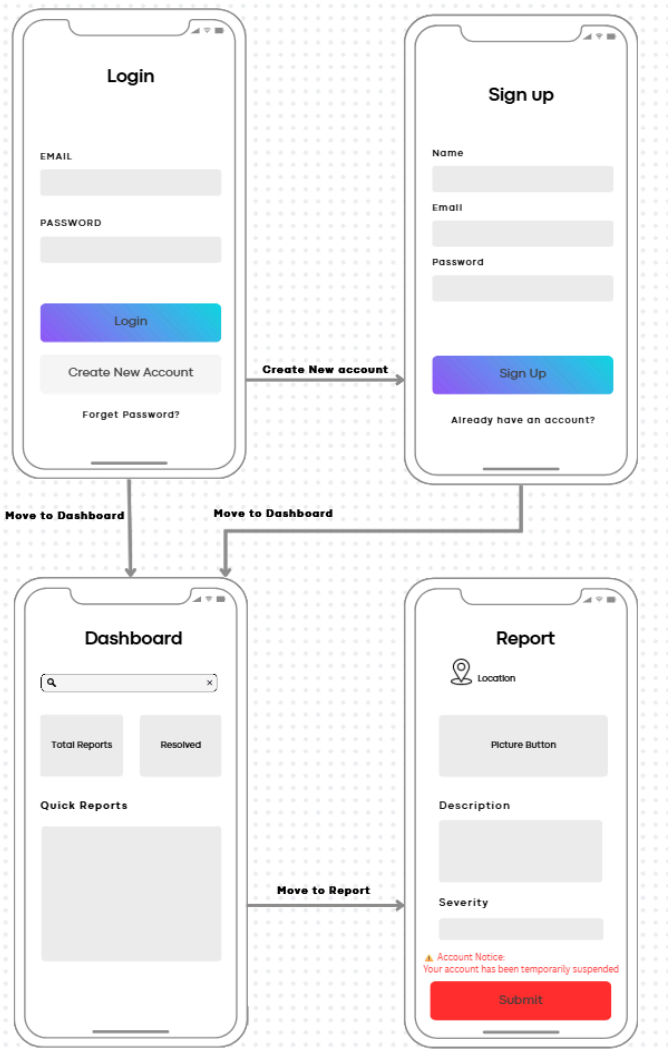
Since it is a Served Persona so no separate screen is required for it, as she does not use the app directly but is getting affected by its usage.

- **Scenario (S-09)**

Title: Misuse / Low-Engagement Report

Bilal **(P-09)** is riding through Johar Town and sees a broken sidewalk. He snaps a picture and uploads it on RAAH but he adds the **wrong location** as he's in a hurry. After a few hours, he checks back, sees no update, and assumes the system is useless. He stops using the app and complains about "government apps being slow" on social media; never realizing his incorrect report caused the delay.

Visual Representation:



7. Design Requirements

These are some high level design requirements derived from the scenarios.

Scenario	Derived Design Requirements
S-01	Must include photo upload, location tagging and submission feedback.
S-02	Must support photo upload, issue category tagging, status updates and resolution notifications.
S-03	Must provide administration dashboard, visual data insights, issue prioritization and real-time reporting data.
S-04	Must provide report filtering, photo/location verification, repair assignment workflow, and progress tracking dashboards.
S-05	Must include live hazard maps, one-tap reporting, smart rerouting suggestions, and real-time road condition notifications.
S-06	Must support quick hazard reporting with photo upload, GPS tagging and instant alerts.
S-07	Must provide report filtering, photo/location verification, repair assignment workflow, and status dashboards.
S-09	Must include auto-location lock, duplicate report detection, and credibility scoring.

8. Conclusion

RAAH represents a significant step toward transforming how road hazards are identified, reported, and resolved in Pakistan. By creating a smart and accessible communication channel between citizens and municipal authorities, the system addresses long-standing issues of delayed maintenance and poor coordination. Through its real-time reporting, data verification, and inclusive design features, RAAH empowers users to take an active role in improving road safety and urban infrastructure. Ultimately, it fosters a more connected, responsive, and accountable ecosystem that enhances mobility, reduces hazards, and improves the quality of life for all citizens.

Appendix A – Data Summary

Research Method	Target Group	Sample Size	Key Insights
Questionnaire Survey	End Users	67 respondents	- 90% reported facing potholes or broken signals weekly. - 85% said they'd use an app to report road issues. - 60% preferred bilingual interface. - 75% want real-time updates on report progress. - 68% experience delays of 10–20 mins due to road issues.
Questionnaire Survey	Civil Engineers	3 respondents	- 90% rely on manual reports or citizen calls. - 70% face difficulty verifying report locations. - 100% support citizen-driven digital reporting. - 80% prefer a photo-upload feature for accuracy.
Interviews	All Stakeholders	20 interviews	- Wardens face daily challenges with broken lights. - Drivers want alerts about blocked or flooded roads. - Guards emphasize visual simplicity. - Common issue: lack of feedback from authorities.
Observation & Secondary Review	Existing Apps	4 apps	- Most existing systems lack authentication or tracking. - No local language support or personalization. - Poor feedback loops and outdated design.

Appendix B – Tools Used

- For Persona Creation: https://uxpressia.com/
- For Scenario Visualization: https://www.canva.com/