

Community Service and Emergency Response Application

Project Overview and Interest:

Our project concentrates on developing a *Community Health Support and Emergency Response App* aimed at connecting trained local volunteers with people in need during medical emergencies. *The goal is to bridge the critical gap between the incident and professional medical response, reducing response times and providing basic support during crises.* This idea resonates with us because it leverages the strength of communities to offer rapid aid, creating a resilient support system that can make a real difference.

Data Entities and Key Attributes:

1. *Users:*
 - a. User ID, names, contact information, and emergency reporting history.
2. *Volunteers:*
 - a. Volunteer ID, name, medical certifications, location, and availability.
3. *Emergency Cases:*
 - a. Logs each Case ID, emergency type, location, and response status
 - i. *Status:* awaiting response, in progress
4. *Notifications:*
 - a. Notification ID, recipient(s), notification status, and timestamp.
5. *Facilities:*
 - a. Stores information on nearby healthcare facilities, including Facility ID, name, contact information, and distance from the incident.

User Types:

1. *General Users:*
 - a. Use the app to report emergencies.
2. *Certified Volunteers:*
 - a. Receive notifications of nearby emergencies and can respond based on availability.
3. *Dispatch Coordinators:*
 - a. Oversee ongoing emergencies, monitor volunteer responses, and coordinate with professional services.

Primary Use Cases:

1. *Emergency Reporting:*
 - a. Users report incidents, providing location and details, which are then geo-located and broadcast to nearby volunteers.
2. *Volunteer Response:*
 - a. Certified volunteers in the vicinity receive notifications, with options to respond and provide initial aid until professionals arrive.

3. *Emergency Case Tracking:*
 - a. Coordinators manage active cases, tracking response times and updating statuses.
4. *Real-Time Notifications:*
 - a. Automated updates keep users and coordinators informed, ensuring clear communication throughout the emergency response.

Use-Case Scenario

- The Community Service and Emergency Response app is designed to bridge the gap between emergency situations and the time it takes to provide crucial medical support. In some cases, ambulances or paramedics face delays due to unforeseen circumstances, which can be critical for those in need, as timely treatment can be a matter of life and death.
- In situations where ambulances may be delayed, the app steps in by notifying the nearest available volunteer from the community. The volunteer is alerted with the details and location of the person requiring aid, allowing them to reach the site, assess the situation, and provide basic medical support if needed. In cases of severe emergencies, the trained volunteer can also coordinate with paramedics and, if necessary, transport the individual to a nearby hospital while awaiting professional assistance.
- The app is intended to support those in acute pain or distress, helping to provide immediate care and reducing the impact of any delays in professional medical response.

Cost Model

- The app is intended to be free for users, as its primary goal is to assist those in need without financial barriers. However, revenue could be generated through partnerships with healthcare organisations or municipal services. Volunteers could also be reimbursed via a users healthplan if it is part of their profile or through medicare the same way hospitals are reimbursed for patients without an ability to pay.

Personal Connection

- Unfortunately, multiple team members have experience with poor response times for existing emergency services. One group member waited in excess of 60-minutes for paramedics to arrive when a friend succumbed to a severe back injury leaving her immobile and helpless until professionals arrived. Another member has recurring experiences due to the austerity of their community; the nearest emergency room is more than 30-minutes away by car. This app aims to address these gaps, helping those in urgent need receive timely care through local community support networks.

Example User Personas

Persona 1: Julie – The Concerned Family Member

- Profile: Julie is a 30-year-old professional who lives with her elderly mother. She is an engineer and wants peace of mind that her mother will receive help promptly in an emergency.
- Usage: Julie uses the app to set up her mother's profile and receives alerts if any emergency is reported nearby.
- Goal: Ensuring her mother's safety and rapid response during health emergencies.

Persona 2: Mark – The Certified Volunteer

- Profile: Mark is a 38-year-old paramedic with certifications in first aid and CPR. He has a flexible work schedule and lives in a densely populated area where he sees value in supporting local emergency responses.
- Usage: Mark uses the app to receive notifications when emergencies are reported near him. He checks the details, confirms his availability, and assists when possible until paramedics arrive.
- Goal: Providing basic medical aid to bridge the gap until professional responders arrive.

Persona 3: Carol – The Dispatch Coordinator

- Profile: Carol is a 45-year-old dispatcher for emergency services, overseeing emergency calls and volunteer responses.
- Usage: Carol uses the app to monitor active cases, assign volunteers, and update response statuses. She also contacts hospitals and paramedics when further assistance is needed.
- Goal: Coordinating emergency response effectively to minimise delays.

Persona 4: Alex – The Health Facility Manager

- Profile: Alex is a 50-year-old manager at a local health clinic who oversees emergency support services.
- Usage: Alex uses the app to monitor emergency cases and receive notifications when patients may be on their way. He can track estimated arrival times and coordinate with the facility's staff to prepare for incoming patients.
- Goal: Preparing healthcare staff and resources in advance for emergencies brought to their facility by volunteers.

Business Rules and Logic

Emergency Reporting and Notification:

- A User can report an emergency by creating an Emergency Case, which includes the emergency type and location.
- The app automatically locates nearby Volunteers based on location data and certifications, prioritising those closest to the incident.
- The Notification entity records each notification sent to eligible Volunteers, including timestamp and status updates.

Volunteer Response:

- A Volunteer can respond to an Emergency Case after receiving a notification, updating their status to "in-progress."

- A Volunteer must have the necessary certifications (e.g., CPR or first aid) to respond to certain emergency types.
- If a Volunteer is unavailable, the system automatically notifies other nearby Volunteers until one responds.

Case Tracking and Status Updates:

- Each Emergency Case has a status (awaiting response, in-progress, resolved) that is updated based on volunteer or coordinator actions.
- Dispatch Coordinators monitor cases, updating statuses and managing volunteer involvement as needed.
- Each Emergency Case is assigned to a coordinator who oversees its progress from reporting to resolution.

Facility Management and Notifications:

- The Facilities entity links nearby healthcare facilities to emergency cases by distance, allowing Dispatch Coordinators and Volunteers to coordinate for timely handovers.
- If the situation is critical, the Coordinator can notify the nearest healthcare facility in advance of the patient's arrival

Data and Response Tracking:

- The Notification entity logs each message to track response times and volunteer engagement.
- The app collects data on response times for each case to analyze trends and improve future response efficiency

Entity-Relationship Diagram (ERD)

The application architecture includes 5 primary modules:

1. User Interface:
 - a. Simple, user-friendly interface allowing users to report incidents quickly.
2. Case Request
 - a. Concise form with pertinent information
3. Geolocation Services:
 - a. Automatically detects the location of the user and connects with the nearest volunteers.
4. Notification System:
 - a. Sends real-time alerts to volunteers and coordinators for timely response.
5. Response Tracking:
 - a. Allows coordinators to oversee and update the status of each case in real time.

Users

- *Attributes:* User_ID (PK), Name, Contact_Info, Emergency_History (FK to Emergency_Cases)

Volunteers

- *Attributes:* Volunteer_ID (PK), Name, Certifications, Location, Availability_Status

Emergency Cases

- *Attributes:* Case_ID (PK), Emergency_Type, Location, Status, Response_Time, User_ID (FK)

Notifications

- *Attributes:* Notification_ID (PK), Recipient_ID (FK), Status, Timestamp, Case_ID (FK)

Facilities

- *Attributes:* Facility_ID (PK), Name, Contact_Info, Distance_from_Incident, Address

Relationships:

- *Users and Emergency Cases:*
 - Many-to-Many (many users can report multiple cases each).
- *Volunteers and Emergency Cases:*
 - Many-to-Many (a volunteer can respond to multiple cases, and a case can have multiple volunteers).
- *Emergency Cases and Notifications:*
 - One-to-One (each emergency has a simple notification system so the user gets personalized support throughout)

