Emergency Medical Transportation

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Elementary Understanding

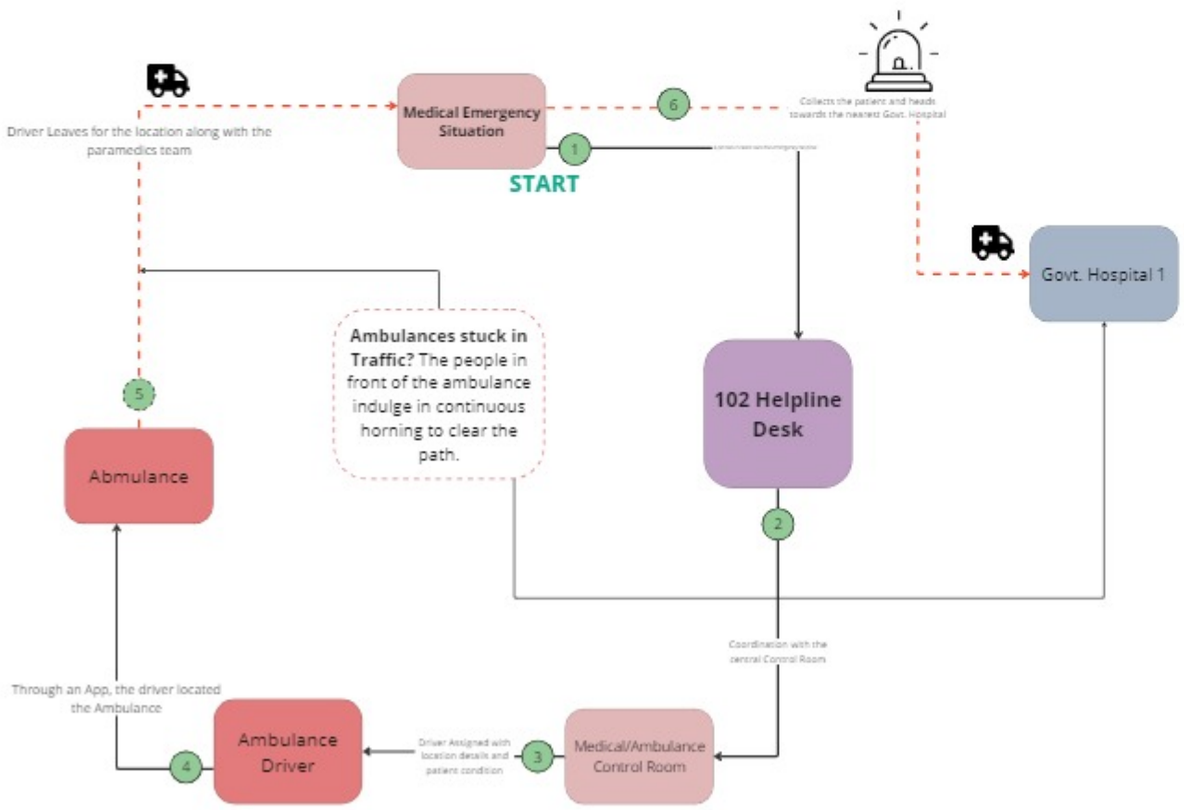
Understanding the

Emergency Medical Transportation

of Bengaluru

In the growing city of Bengaluru where growth sees its clear reflection, its challenging to predict the lifespan of a product or a service which is in place. In such a case, a crucial service like medical emergency transport seeks continuous advancement.

Our initial RAW understanding of the setting



24,012

patients die due to delay in getting medical help as ambulances are delayed due to traffic

1,46,113

- According to a report published by Times of India about ***146,133*** people were killed in road accidents in India
- ***30%*** of deaths are caused due to delayed ambulance.
- ***50%*** of heart attack cases reach hospital late

Bengaluru's total vehivular population doubled from 55.2l to 1.1 crores in 10 years

Experts in the city say increase in the personal vehicles will put more pressure on the already stressed road network

Average waiting time for an Ambulance in Bangalore in 40 mins now.

Average waiting time for an Ambulance in Bangalore in 40 mins now.

Is Bengaluru traffic the only issue ?

Research Articles

CASE STUDIES

1

Traffic congestion in Bilaspur, India, causing fatalities, notably affecting patients en route to hospitals, challenging Sanjeevni 108 ambulance service, risking lives. Importance of timely medical intervention emphasized.

2

The video contrasts ambulance priority in India vs. foreign nations, stressing societal attitudes' impact. It advocates for individual responsibility and cultural change to ensure effective emergency services beyond blaming the government.

3

A two-year-old girl in Bangalore, rushed from Mysore Road to Manipal Hospital on Old Airport Road, faced severe delays due to traffic congestion. Despite efforts, she was pronounced dead upon arrival.

COMMENTS: 'Ambulances in India fail to arrive on time and are mostly ill-equipped'.
? The question, is whether India has an effective and accessible emergency care system in place, starting with the first necessity, ambulances.

INITIATIVES/SYSTEMS

Four months after launch, bike ambulances in Bengaluru attend to a dozen calls a day

Bike ambulances were introduced in Bengaluru to ensure that victims of accidents or other emergencies got timely medical help. Since April, these ambulances have responded to over 700 calls in the city.

1

Bangalore introduced a pilot project with 18 **bike ambulances** to combat traffic delays in emergencies. Operated by trained paramedics, they provide rapid response and initial care, handling minor injuries until four-wheeler ambulances arrive. Despite success, scaling faces challenges like finding licensed paramedics.

2

Bangalore traffic police are installing **adaptive signal lights** to aid ambulance passage through intersections. Sensors detect ambulances and switch lights green from 200 meters, aiming to minimize critical "golden hour" delays, with potential for broader traffic management enhancements.

Countdown begins for 51 adaptive signals

KRIDCL has floated a tender for installation, and maintenance of automated traffic signals at 51 new junctions

Adaptive signals to soon help ambulances tackle Bengaluru traffic

With the help of sensors, the technology will open the signals for ambulances detecting the vehicle from as far as 200 meters, said the senior traffic police officer.

3

RED.health ambulances in India ensure swift emergency responses with 5,000+ units across 550+ cities, equipped with advanced medical tools. They offer 5G connectivity, telemedicine integration, 24/7 availability, and various service types, catering to emergencies, non-emergencies, inter-facility transfers, and disaster relief.

Positionality

Our viewing

Enhancement of Resilience:

Healthy populations are more resilient to environmental, social, and economic shocks and stresses. By investing in healthcare systems and disease prevention, we build resilience at the individual, community, and societal levels, contributing to overall sustainability.

Conservation of Human Potential:

Every life saved represents a reservoir of human potential, innovation, and creativity. By investing in health and education, we unlock this potential, enabling individuals to contribute to sustainable solutions to global challenges.

Promotion of Sustainable Development Goals (SDGs):

Saving human lives is integral to achieving many of the Sustainable Development Goals (SDGs), including those related to health (SDG 3) etc. By addressing health disparities and improving access to healthcare, we advance progress towards multiple SDGs.

Sustainable Development Goals

that the ambulance service contributes to

SDG 3 - Good Health and Well-being:

Ambulance services deliver timely emergency medical care, reducing mortality rates and improving health outcomes.
Access to ambulance services enhances overall well-being by addressing medical emergencies effectively.

SDG 4 - Quality Education:

Ambulance services support educational initiatives by offering first aid training and emergency response programs.
Training paramedics, EMTs, and communities builds capacity and improves emergency response, aligning with education goals.

SDG 11 - Sustainable Cities and Communities:

Ambulance services provide rapid response and medical care, enhancing safety and resilience in urban areas.
They contribute to creating safer communities and ensuring the well-being of urban populations.

SDG 17 - Partnerships for the Goals:

Ambulance services operate through partnerships between government, healthcare providers, nonprofits, and communities.
Collaboration ensures effective delivery of emergency medical services, advancing health and well-being goals.

Literature Review

Role of Police

- Traffic junction officers manual turn green lights for approaching ambulances.
- Advanced systems exist where signals communicate and automatically prioritize ambulances.
- Police recommends public to dial 112 or use KSP app to report ambulance needs.
- Existing tracking technology needs government implementation for traffic management.
- Police verify emergencies to prevent misuse of sirens and prioritize genuine cases.
- Agrees to Dopplers effect
- Mentioned that the ambulance drivers or ambulance crew can directly call 112 but they usually call the respective hospital and the hospital has to then call TMC to clear traffic.
- Incase of a very serious emergency, they expect to be informed at the control room by the driver/paramedics.

Role of Hospital and Ambulance

- Ambulances are equipped with BLS, microphones for use in emergency situations.
- "Nagu Magu" ambulances likely refers to ALS specific ambulance service.
- Ambulance drivers are trained in Basic Life Support (BLS) procedures.
- Government ambulances in India are equipped with GPS tracking systems.
- Ambulance sirens are activated even without a patient on board, if the vehicle is transporting blood.
- Paramedics can contact TMC(Traffic Management Centre) directly by dailing the 10 digit number for traffic clearance in case of congestion.
- Doctors only accompany ambulances in critical situations involving ventilators, breathing difficulties, or severe blood loss.

Service Triangle

Role of Public

As per Rule 27 of the Motor Vehicles Regulation Act, when you hear/see an emergency vehicle:

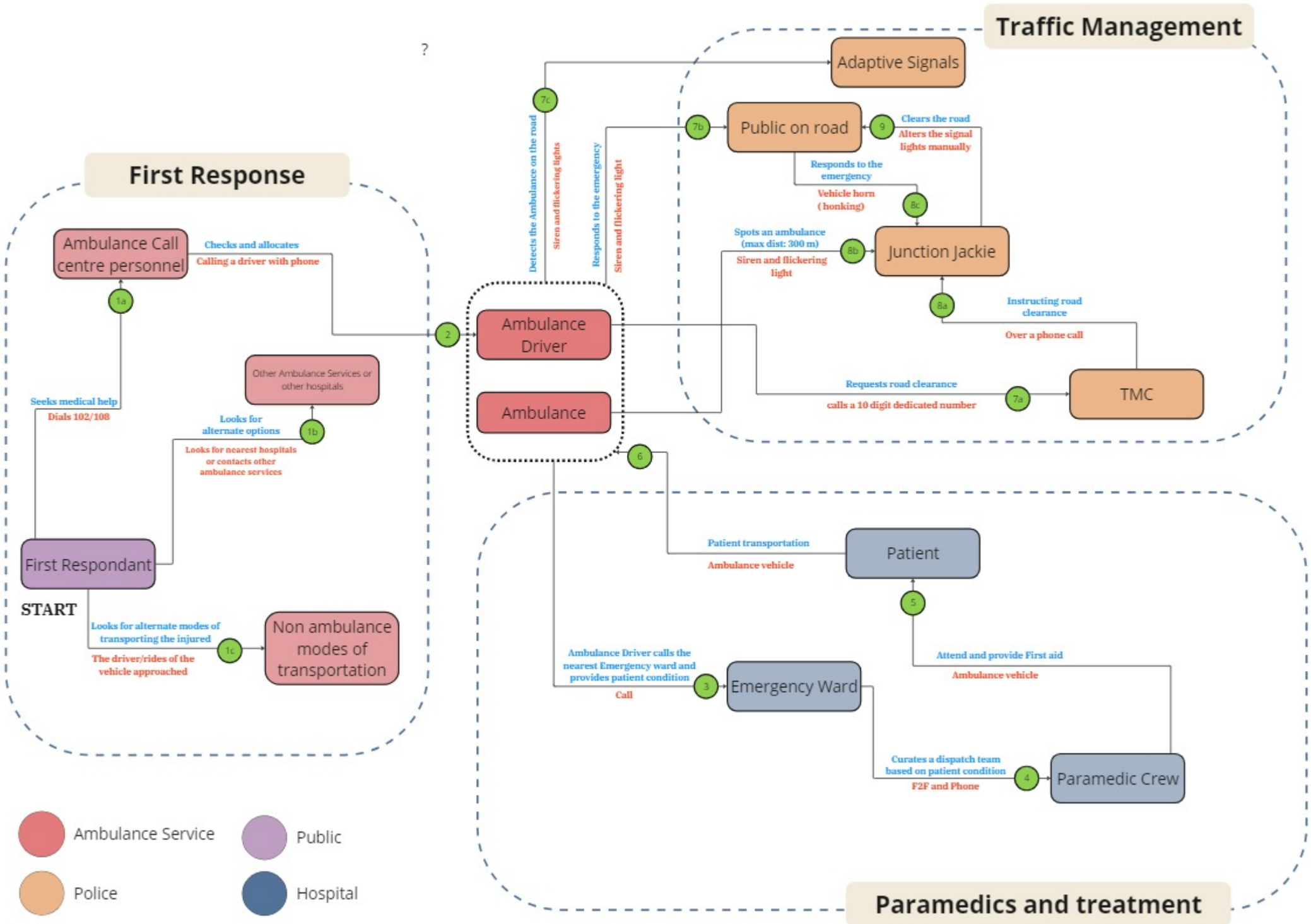
- React quickly, but calmly before pulling over and use your turn signals.
- Wait until the emergency vehicle has passed.
- Stay alert and look for more than one emergency vehicle approaching.
- Never follow or try to outrun an emergency vehicle.
- Pedestrians and cyclists are also required to get out of the way for an emergency vehicle.

KEY OBJECTIVES

The objective is to **IDENTIFY**, **ASSESS** and **EVALUATE** the existing medical emergency service in an urban context like Bengaluru, with the aim of locating areas for improvement and implementing targeted interventions to enhance the already existing emergency response service.

1. Understanding the existing system.
2. Identification of gaps.
3. Evaluation of the co-existence of the actors in the service.
4. Considering technological interventions if any.

Process Mapping



Contextual Interviews

Ambulance control Room

- The 108 call center in Basaveshwara Nagara serves all of Karnataka for medical emergencies.
- Ambulances are dispatched based on their proximity to the emergency location.
- Call center personnel cannot assess patient criticality to assign Basic Life Support (BLS) or Advanced Life Support (ALS) ambulances.
- ALS ambulances are provided upon request by the caller.
- If an ambulance encounters traffic congestion, the caller or ambulance crew can contact the Traffic Management Center (TMC) for assistance.
- When the nearest ambulance is unavailable or unsuitable (BLS for ALS requirement), the call center seeks the next closest option.
- If the nearest available ambulance is a BLS unit and an ALS unit is needed, the ambulance driver guides the call center personnel to the next nearest available ALS ambulance.

Ambulance Service

- Ambulance sirens are activated even without a patient on board if the vehicle is transporting blood.
- Ambulances are equipped with microphones for intimating the public.
- Paramedics contact to TMC through 10 digit mobile number to request traffic clearance if needed.
- Drivers are trained in Basic Life Support (BLS) procedures.
- Doctors only accompany ambulances in critical situations involving ventilators, breathing difficulties, or severe blood loss.
- Ambulances are equipped with GPS tracking systems.
- Despite having this technology, the tracking system is not utilised for clearing traffic congestion.

Police Stations

- Utilization of walkie-talkies for communication between traffic police officers to notify about ambulance movements.
- Limited effectiveness of adaptive traffic signals in managing emergency situations, highlighting the necessity of human intervention.
- Traffic police prioritize giving way to ambulances and coordinating with other traffic police units to ensure smooth traffic flow.
- More adaptive traffic signals and improved traffic management technology to prioritize emergency vehicles effectively.

Traffic Management Center

- Ambulances rely on a separate phone number to contact traffic police
- In cases requiring urgent traffic assistance, ambulances can directly contact traffic police for intervention
- "Adaptive Signals" are acknowledged as ineffective during emergency situations, emphasizing the necessity of human intervention despite technological advancements.
- An app "Astra" provides real-time updates every 15 minutes, indicating roads with severe and moderate traffic, facilitating immediate traffic police intervention.
- Hospitals coordinate organ transplant procedures with the health department, which then informs the Traffic Management Center (TMC) and Bangalore Traffic Police (BTP) via Whatsapp groups.
- Bangalore's urban infrastructure is organized in concentric circles, differing from the grid system in the US.
- TMC engages with the public through social media platforms such as Facebook, allowing citizens to tag TMC and report accidents or other incidents for prompt response.

Govt and Pvt Hospital

- Despite various types of sirens indicating the severity of the situation, public awareness of their meanings is lacking, highlighting the need for Basic Life Support (BLS) training for the general population.
- Ambulance drivers use a microphone to make announcements for clearing traffic during emergencies, but there's limited use of the tracking system and GPS installed in ambulances to mitigate traffic congestion.
- Government hospitals receive accident cases but often lack adequate infrastructure to handle various emergencies, contributing to healthcare challenges.
- Emergency services in Bilaspur dispatch ambulances promptly upon receiving calls, typically within 5-10 minutes, with a team comprising a driver, housekeeping staff, nursing staff, and doctor, equipped with necessary medicines and both Basic Life Support (BLS) and Advanced Life Support (ALS) capabilities.

Sources:

- **Kamakshipalya Police Station**
- **Victoria Government Hospital, Bengaluru**
- **Ambulance Control Room, Basaveshwaranagar**
- **Apollo Hospital, Jayanagar**
- **New Horizon Hospital, Jayanagar**
- **Sakara Hospital, Bellandur**
- **Jayanagar Traffic Police Station**
- **Traffic Management Center, Brigade Road**

Probing

Probing the Public

Interviewed 10 Individuals

Sample Type: Varied across age groups

Sample Type: Both men and women

- In order to decipher the level of understanding and awareness with regards to the actions which needed to be taken as general public during a medical or fire emergency, a probe was considered.
- Unlike an oral questioning/interviewing this probe makes use of a visual cue to facilitate better relate-ability in the context this project is set on.

What the system has to say about public's participation

On Field Policeman
The public have minimum road sense, their urgency to reach somewhere surpasses all rules which needs to be followed.

Emergency Ward Nurse
The public are very insensitive these days, they film the incident and the injured rather than saving them in the first place.

Traffic Management Centre
1.When stuck in traffic, people can call 112 and let us know the location of the jam
2. Also, by just following traffic rules half the congestion on road may be avoided.
3. Awareness on the usage of public transport, reduce the load on the road.

Ambulance Driver
Even with auditory signalling with siren, people take their own sweet time to act upon the situation and make way. They sometimes tail and ambulance to be able to skip signals with ease.

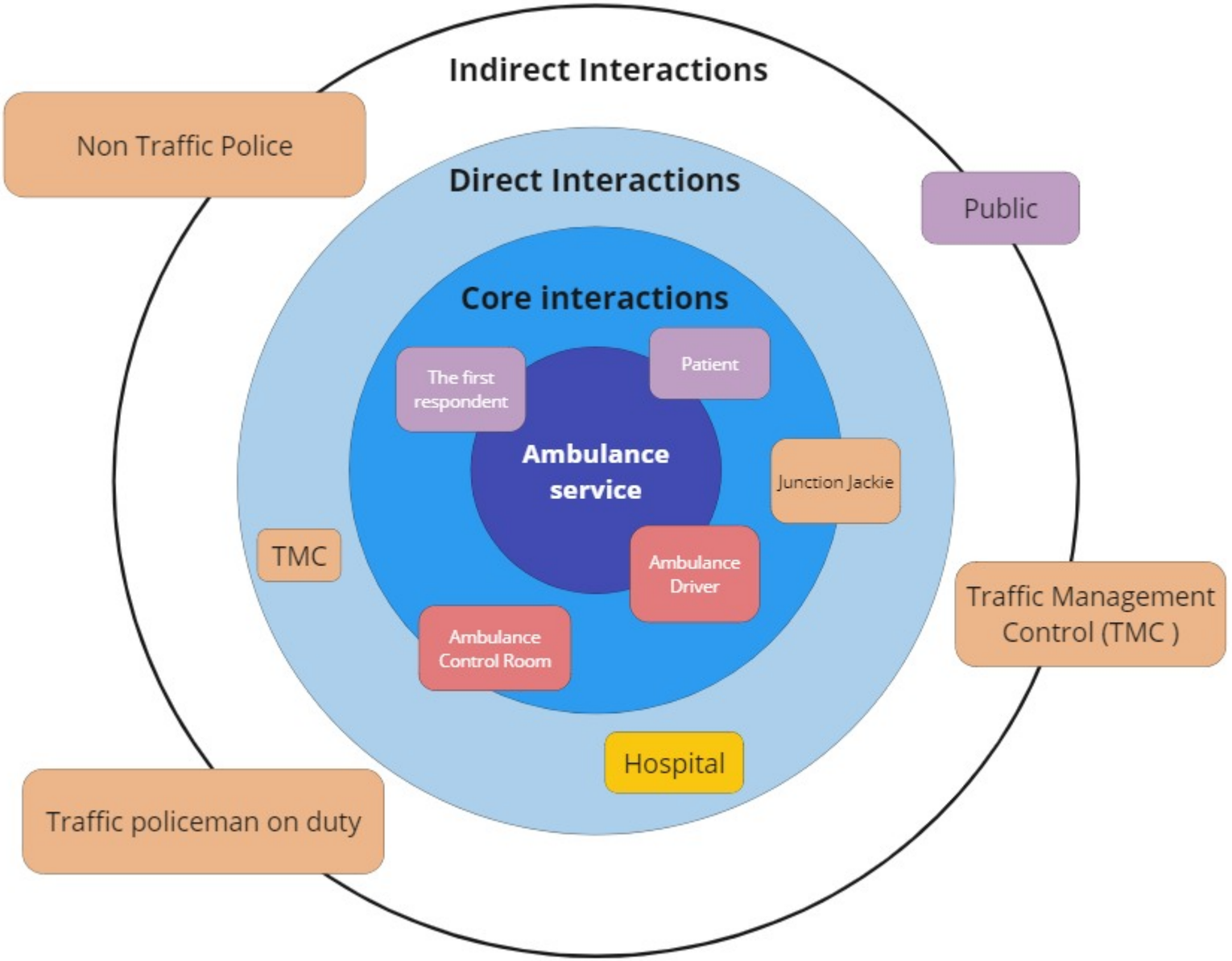
Scenario 1:
If you witness an accident on road what will you do as a first responded to the location?

Scenario 2:
You are heading to the office for an interview in your personal vehicle . You sight an ambulance which is also waiting for the traffic to clear .
What steps do you take ?

INSIGHTS

- Use of emergency number 108 to call for medical assistance.
- In case of unavailability of immediate ambulance response, individuals resort to searching for nearby hospital contacts through Google.
- Some individuals prioritize providing immediate assistance to the injured and, if possible, transport them to the nearest medical facility using alternative means such as auto-rickshaws or personal vehicles.
- Limited awareness about alternative emergency contact numbers such as TMC or 112 during traffic congestion.
- Proactive measures such as providing first aid, contacting medical services, and ensuring the injured receive timely medical attention.

Stakeholder Mapping



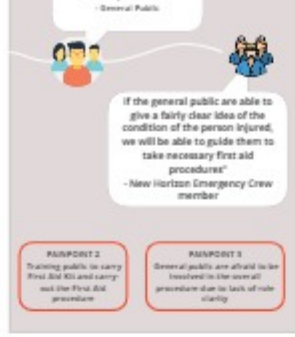
Visibility Metrix

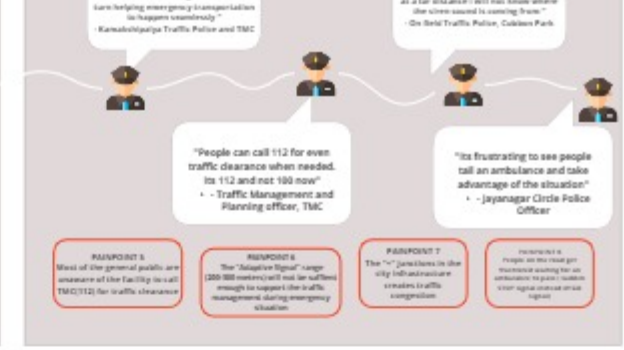
	Road Accident	Initiation of First response	Dispatch of the ambulance based on availabilty	Arrival of ambulance at the accident spot	Navigating through city roads	Reaching the Hospital
Foreground	Capture the incident CCTV Cameras capture the incident An audience like behavior (like filming the accident spot) Ideally: Films the situation and tag the TMC on Twitter and Facebook for intimation Social Media	Realization of medical emergency Calling Ambulance (102 / 108) Taking them in their own vehicle or other modes of transport Calling the alternate ambulance Ideally: Instruct public to initiate concurrent basic procedures like pulse checking, eye dilation etc.	Confirmation of an ambulance vehicle with driver Calling the ambulance driver	Establishing contact with the first responder and police Initiation of first aid by paramedics in ambulance Google Maps Ideally: Info. on accident traffic cycle adapts to the accident/ emergency situation Ideally: AI Technology/IR	Driver flashes on there as well as the mic to intimate the public Driver gets in touch with the TMC to clear the traffic Ideally: Adaptive signals combine the ambulance siren (within the radius of incidence) Public Handing/guiding the vehicle movements to make way Ideally: Public Call the TMC or 112 to help clear the traffic Driver dials the 10 digit contact number to TMC Ideally: Signal automatically turns Green	Reaching the Trauma Care Entrance
Middle ground	Takes necessary actions based on Footage/Social media post	Ambulance control room receives the call	based on the patients condition, a relevant ambulance service is organized.		Adaptive Traffic Signals automatically detect the presence of an ambulance using sensors and cameras and switches to green signal and automatically switches back to red once the ambulance has passed Traffic police manually switches to green signal TMC accepts the traffic clearance request	
Background		Patient condition Details and location sent to the hospital Intimating the police about accident along with location details	Based on the patients condition, hospital decides the paramedics crew members		Jackie Intimates the next traffic junction about the ambulance Walky-Talky TMC communicates with the On field Jackie over call Ideally: Hospital tracks the ambulance using Tracking System	

Legend
- Ambulance Service
- Police
- Public
- Hospital
- Ideal Expectation

Painpoint Mapping

Evidence





Pain Points

PAINPOINT 1
Lack of public awareness about the importance of first response

PAINPOINT 2
Training public to carry First Aid Kit and carry out the First Aid procedure

PAINPOINT 3
General public are afraid to be involved in the overall procedure due to lack of role clarity

PAINPOINT 4
There is no back up Ambulance facility during an unforeseen incident (eg: Ambulance breaks down)

PAINPOINT 5
Most of the general public are unaware of the facility to call TMC/112 for traffic clearance

PAINPOINT 6
The "Adaptive Signal" range (200-300 meters) will not be sufficient enough to support the traffic management during emergency situation

PAINPOINT 7
The "+" junctions in the city infrastructure creates traffic congestion

Legend
- Emergency ward nurse
- Police
- Public
- Ambulance Call Center
- Paramedic Crew

Ideation: Pattern Language

Potential Ideas

Contextual Assistance: Educative Waiting time

Interactions build trust: Introduction of the color Blue in the signal system to indicate the emergency situation time for people waiting on the other roads.

Ideas

Touchpoint presence is perceptible: Billboards which are not distracting but informative but an indication of a touchpoint.

Progress indication: Paramedics are requested to send periodic updates on the patients condition at a regular interval mutually agreed.

Touchpoint limitations known upfront: Make known of the current traffic situation at that time so as to inform the delay in providing services to the family and first respondent.

Easy Comprehension of the encounter flow: Verbal confirmation from the TMC room about their further steps taken

Pre-existent

Know your customer

Directing to a suitable touchpoint

Touchpoint and Customer as collaborators:

Ease in seeking help

Contextual Assistance:

System's Expectations

Freedom to choose from a wide range of TP:Make available major ambulance numbers to the public

Freedom to choose from a wide range of TP: Siren, TMC, Adaptive Signals

Touchpoint at a Hub: Public can contact 112 in case of emergency (not 100)

Freedom to choose from a wide range of TP:Ambulance driver chooses to use his mike to announce the emergency and to request to make way.

Edge Cases Identified

1. Ambulance met in an accident, Ambulance puncture, Lack of petrol, Patient looses their life in ambulance
2. No network or connectivity because phone is the only medium to connect to emergency responders
3. What if the first responder doesn't know the location
4. Handeling Mass causality
5. How do emergency responder handle multiple cases
6. Non emergency realised later and how cancelling a call for an emergency service works
7. What if multiple ambulances are coming from 2 different directions meeting at the same junction? How to handle the situation?

References

- https://timesofindia.indiatimes.com/city/raipur/choking-life-12-on-way-to-hospitals-die-in-traffic-jams/articleshow/54910538.cms

- https://www.team-bhp.com/forum/street-experiences/153131-please-give-right-way-ambulances-emergency-vehicles.html

- https://timesofindia.indiatimes.com/city/bengaluru/when-city-traffic-halts-ambulances-lives/articleshow/37055671.cms

- https://www.timesnownews.com/bengaluru/child-patient-dies-after-ambulance-stuck-in-bengaluru-traffic-jam-video-goes-viral-article-97574583#:~:text=Hassan%20to%20Bengaluru.-,The%20ambulance%20was%20caught%20up%20in%20traffic%20at%20Nelamangala%2DGoreguntepalya,Punjab%20in%20January%20last%20year.

- https://www.deccanherald.com/india/too-little-too-late-emergency-services-require-urgent-care-1216452.html

Read more at:
https://health.economictimes.indiatimes.com/news/industry/ambulances-in-india-fail-to-arrive-on-time-and-are-mostly-ill-equipped/92413976

Emergency Medical Transportation

CONCEPTS

Concept 1: Public Awareness

Problem Statement:

The interactions with traffic authorities, ambulance control rooms, and ambulance drivers revealed a critical issue: the lack of public awareness during emergency situations. Surveys confirmed this, as many individuals were unaware of their roles as first responders, basic life support (BLS) techniques, and the emergency number 112. Moreover, traffic congestion exacerbated by public ignorance of traffic rules further hindered emergency services' effectiveness.

Scenario 1

Effective Waiting Time (Inside Buses):
Digital Displays: Replace next stop information with short, informative slides on BLS, the emergency number, and proper ambulance etiquette (giving way, not flashing lights). Update content regularly to maintain engagement.
Speaker Announcements: Broadcast engaging audio messages about emergency response during travel intervals.
QR Codes: Display QR codes on posters or stickers within the bus, linking to detailed guides and resources online.

Scenario 2

Mobile Awareness Platform (Bus Exterior):
- Design eye-catching posters with key messages on BLS, the emergency number, and etiquette.
- Introduce rotating banners showcasing different emergency response topics. This adds dynamism and keeps the content fresh.

Additional Considerations:
- **Accessibility:** Ensure all content (visual, audio) is accessible to people with disabilities.
- **Multilingual Content:** Cater to diverse populations by providing information in multiple languages.
- **Partnerships and Evaluation & Feedback**

Feasibility and Efficiency:
- Leverages existing infrastructure and resources within the public transport system.
- Simple and concise messages ensure quick comprehension.

Scaling and Sustainability:
- Easily implemented across different bus routes and public transport systems.
- Adaptable to other public transport modes like trains, metro, and cabs.

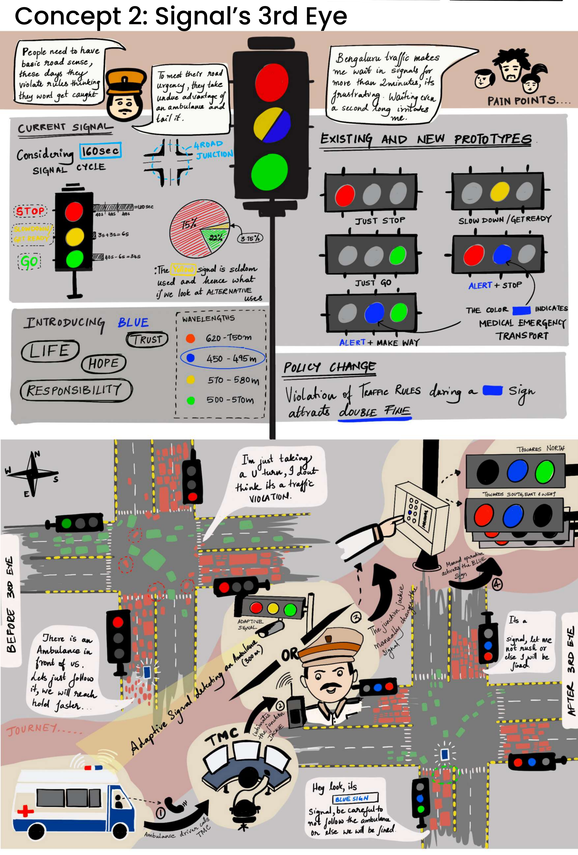
Target Audience:
Public transport passengers, including pedestrians and onlookers exposed to bus exteriors.

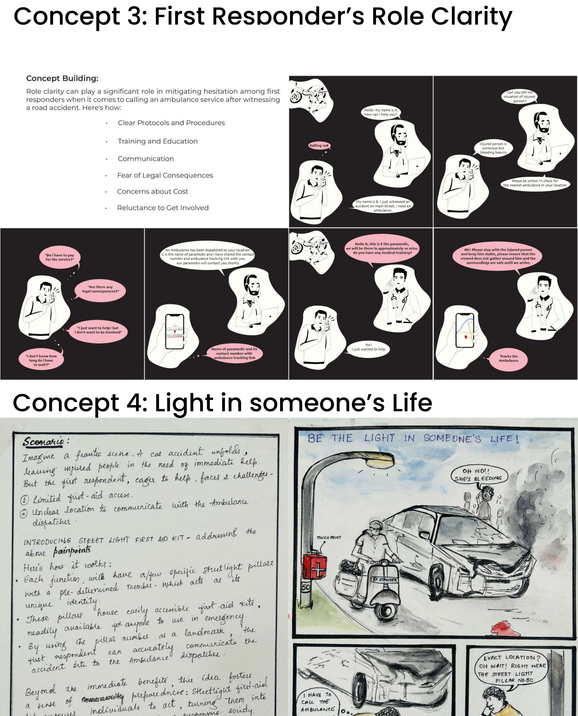
Benefits:

Increased Public Awareness: Educates citizens on crucial topics, potentially saving lives in emergencies.
Empowered Citizens: Equips individuals with basic knowledge and skills, fostering confidence and reducing panic in critical situations.
Improved Emergency Response: Promotes proper conduct during emergencies, facilitating faster and more effective response by emergency services.
Positive Social Impact: Contributes to a safer and more prepared community.

This concept utilizes public transport as a unique and effective platform to bridge the gap in emergency response knowledge, empowering citizens and ultimately contributing to a safer and more prepared society.

Concept 2: Signal's 3rd Eye





Concept 3: First Responder's Role Clarity

Concept Building:

Role clarity can play a significant role in mitigating hesitation among first responders when it comes to calling an ambulance service after witnessing a road accident. Here's how:

- Clear Protocols and Procedures
- Training and Education
- Communication
- Fear of Legal Consequences
- Concerns about Cost
- Reluctance to Get Involved

Concept 4: Light in someone's Life