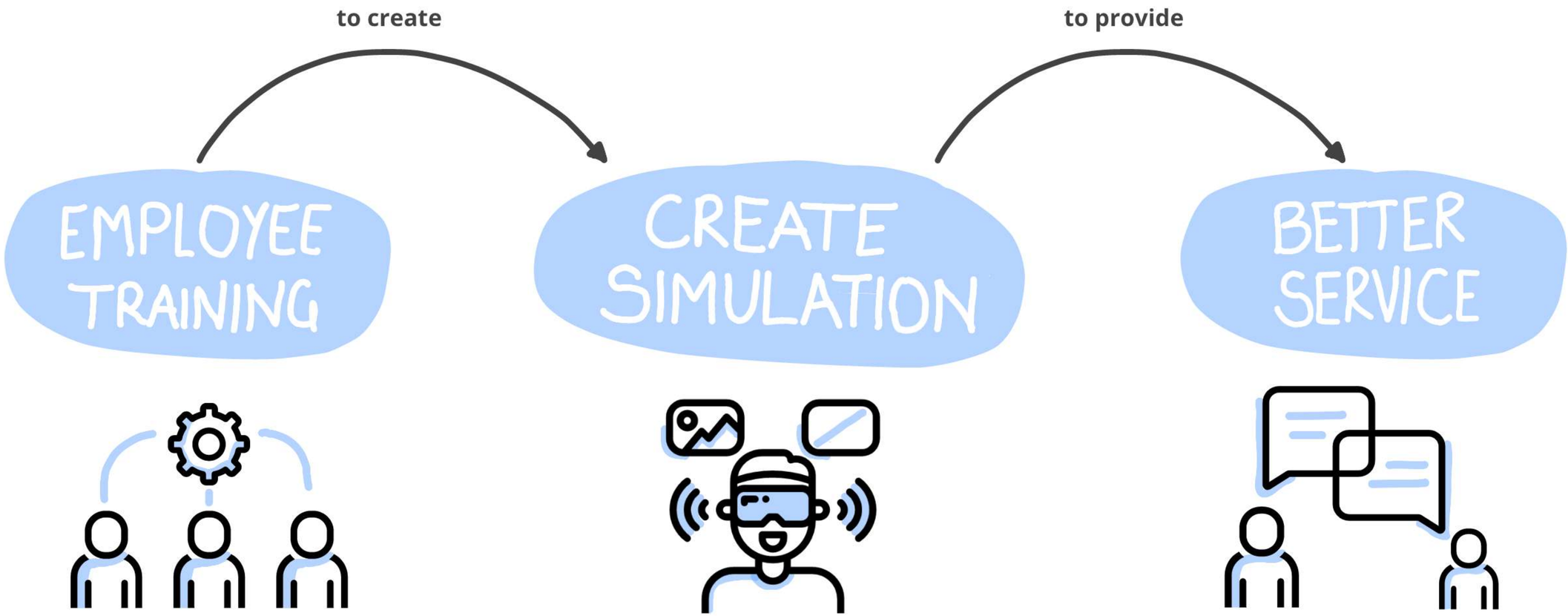
EMT/Paramedic Training using VR

General Focus Area



The status of EMS in India

The Need for effective EMS

23%
Of all trauma that occurs is transportation-related

1,374
No of accidents every day on roads

400
No of deaths every day on roads

77.2%
Trauma caused by falls, drowning, agriculture, burns,etc

42,800
Die every year from sudden cardiac arrest

30,000
No of snake bites every year- highest mortality

75.8%

of EMTs working in ambulance services had personal experience of mental health problems

Ambulance personnel estimated rates of

11% for post-traumatic stress disorder

15% for depression

15% for anxiety

27% for general psychological distress

67%

of EMTs contemplated leaving their job due to the stress of working on-field.

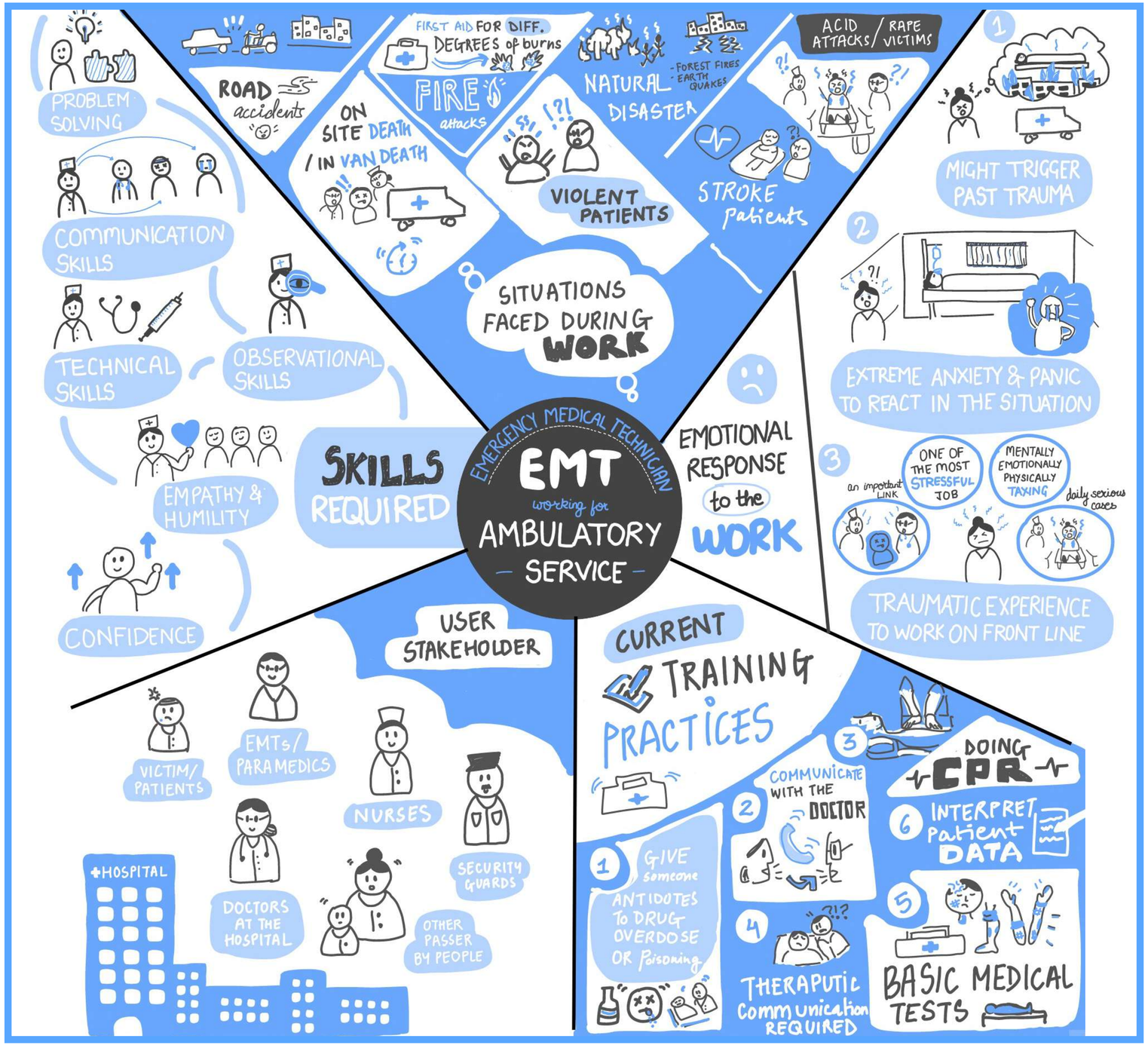
EMTs who experienced burnout were four times as likely to plan to quit their jobs within one year. Thus, EMTs require situational training to better deal with high stress situations.

Understanding the Arena

We created a mindmap detailing out the users and stakeholders of the system, the current training practices and curriculum of EMTs, the skills expected from the EMTs, the kinds of situations they face at work, the emotional response and traumatic experiences caused.

- A lot of stakeholder are affected by EMT's job including doctors, the patient and their family.

- Current EMT training does not include a holistic training for expected skills such as observational, interpersonal, problem solving, composure and confidence.



User Research

The Determined EMT

Age: 30
Work: Hospital Paramedic
Family: Parents, spouse & children
Location: Mumbai

Personality

Introvert — Extrovert

Thinking — Feeling

Analytical — Creative

Alert | **Strong-Willed** | **Persereving**

Goals

1. To quickly asses the field situation and be able to make quick calls on tough situations
2. Quickly administer the required treatment with adequate coordination from team members
3. Be able to efficiently handle the patient's family and close ones to provide emotional support and try maintain normalcy if hindrances are created

Frustrations

1. Longer and stressful working hours
2. Experience extreme pressure and expectations from patient's family members and doctors in the emergency ward to provide the correct first course of treatment
3. Less time to spend with family and friends

Thoughts about EMS

They feel extremely conscious of themselves due to not getting the respect they feel they deserve as they form such a crucial link of the medical process. They receive training however they believe even after the procedural training real adeptness and confidence in the profession comes only after being in that environment multiple times. That sense of urgency and responsibility felt in the moment is something that can only be eased through multiple attempts manuals cannot prepare them for it. They think being on the spot is very stressful and always attempt to do their best for the patient.

EMS Priorities

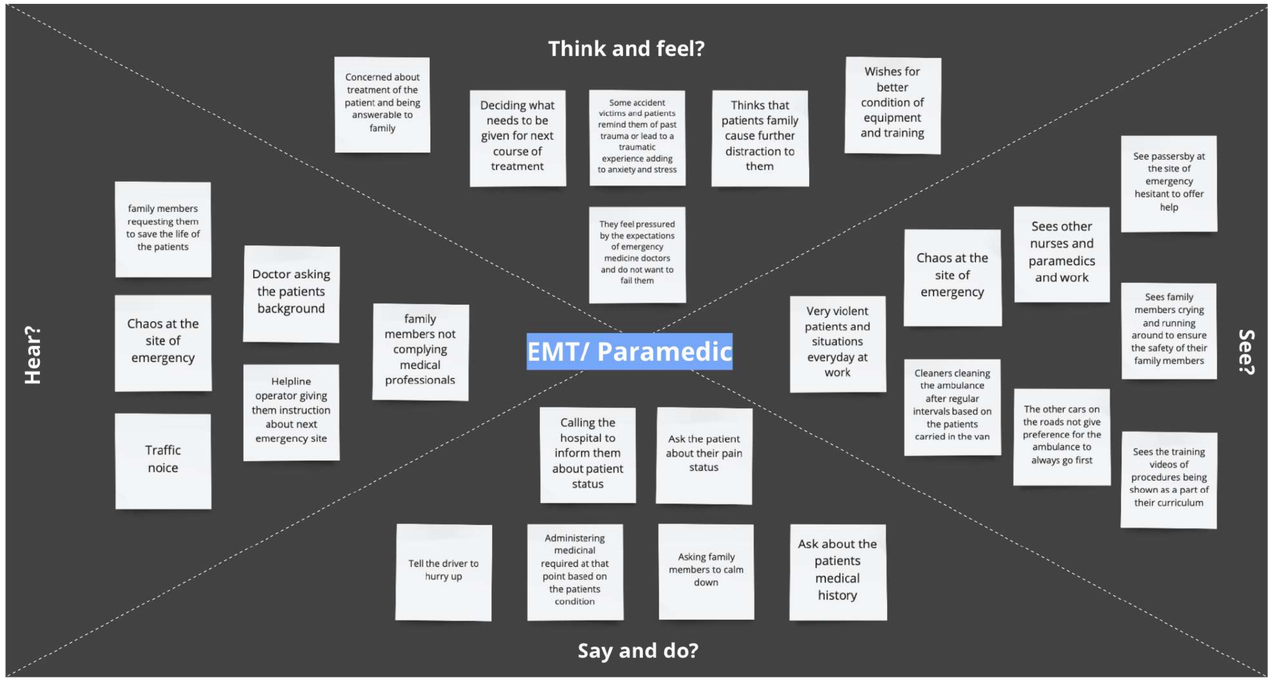
- Vitals Maintained
- Quick Commute Time
- Accurate Reporting of Scene
- Crucial First Treatment Given

Quote

"The condition of some of the victims of accidents witnessed have been extremely disturbing and stressful"

Motivation

- Empathy for Patients
- Sense of Fulfilment
- Appreciation from People



Pain

- Not having enough well trained EMTs in the healthcare system
- EMTs not being able to do their job efficiently because of the chaos created by the patients family
- Lack of standardisation of emergency treatment in the Indian healthcare system

Gain

- Correct actions taken by the EMT within the golden hour can save the patients life
- EMTs giving the right update about the patients background will help the doctor take the right course of action for the patients
- It will strength the indian healthcare system which will increase the trust among citizens

Synthesized User Insights

EMTs

Training institutes do not cover a **realistic understanding of the situational and sensory factors** of working on the field.

People think that they are incapable of performing procedures, escalated by the **lack of communication skills** on their part.

Doctors

Lack of training among the EMTs is directly proportional to **increase in workload and stress** among doctors.

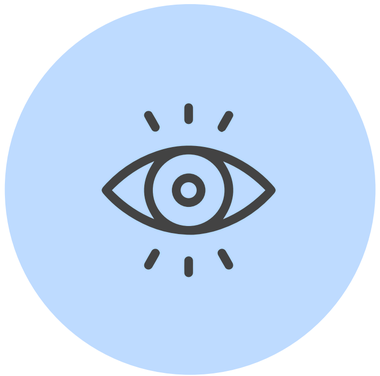
EMTs can help save doctors' crucial time as they cannot be available on field and **increase the chances of patients survival.**

Family Member

Being in an Ambulance provokes panic as it is a proof that loved one is in urgent trouble.

If EMTs does not c**ommunicate well with the family** it causes doubt in the minds of the family.

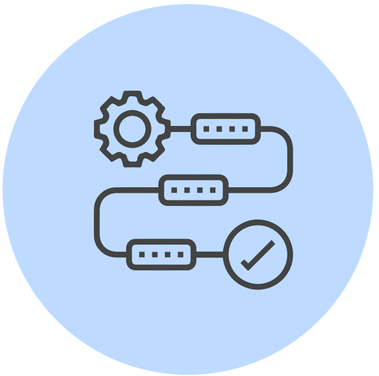
Relevance of VR



Realistic training scenarios & environments

Faster acquisition of knowledge

Improve safety & reduce risk



Clear Safety Procedures

Tangible & Intangible elements of curriculum

Problem Statement

EMTs suffer from **psychological stress** as they are **unprepared** for on field crucial procedures due to a **lack of situational training provided.**

This can be resolved by training to **provide a sense of control and confidence in emergency situations.**

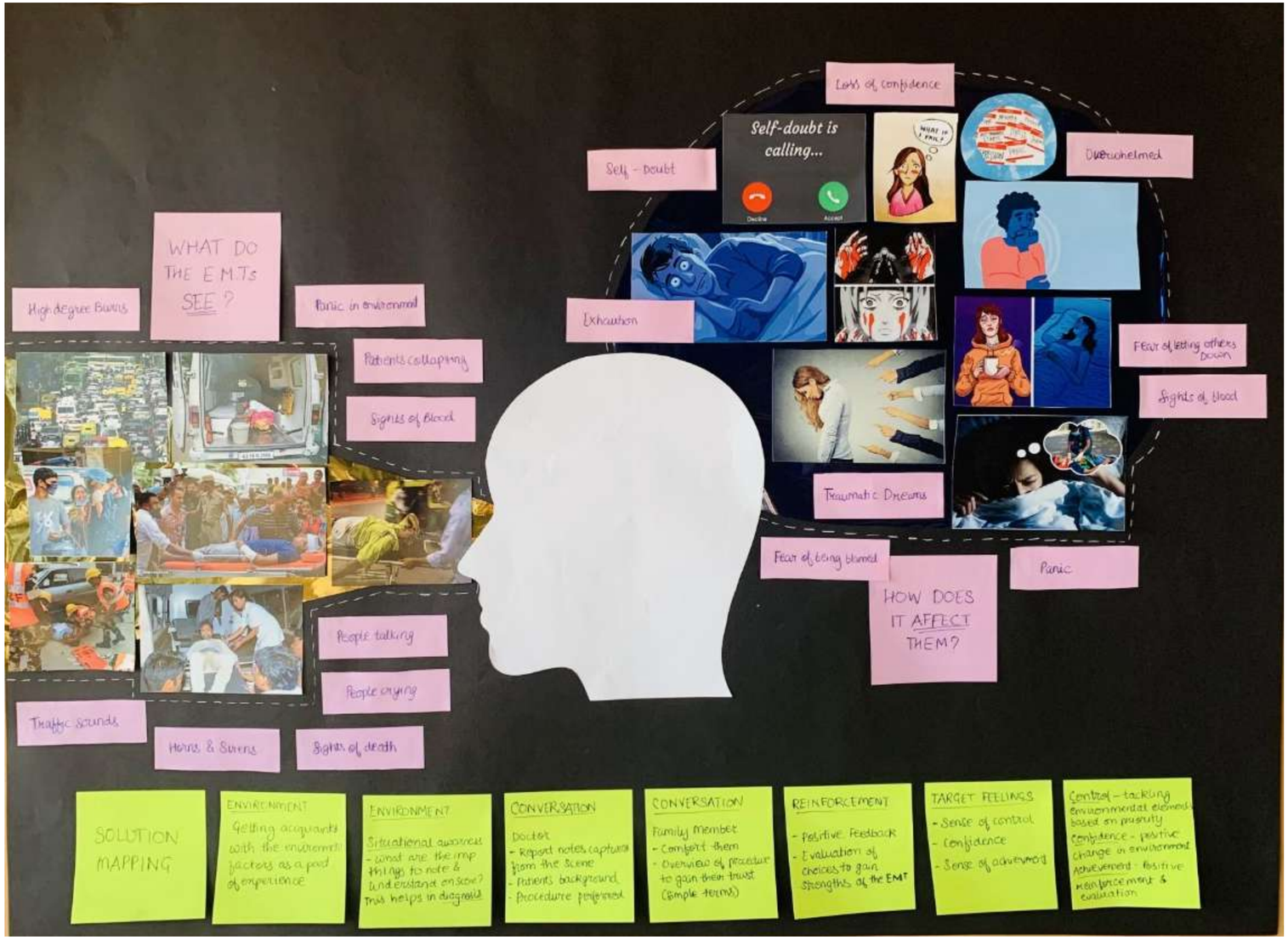
Our Intervention

- EMT's get exposure to the field as a prospective and accessible profession
- Enter training institutes for the 3 month EMT training course
- Provided with theoritical training of protocols, medical procedures, identifying symptoms, caring for people, etc
- Followed by practical training of being given set of instructions to follow with feedback administered on mannequins
- **The EMT starts the psychological and situational training using VR and to learn application of theory and practical execution in stressful scenarios**
- The EMT completes training and is finally appointed for working on the field with ambulatory services

Visual Wall

We mapped the sensory factors of sight, sound and visual experienced by the EMTs to understand how each trigger is processed by them. The key components charted were-

- Self Doubt and Exhaustion
- Gory and overwhelming environmental factors and working through all the sensory overload
- After effects of being unable to perform on site due to all these factors



Final Concept

Guiding through Reinforcement

Experience Design

- Task Call & Kit Selection
- On-site assessment
- First Course Treatment
- Report to doctor

Skills Tested

- Situational awareness
- Problem solving
- Interpersonal skills

Sensory Engagement

- Environmental Sound scape (crowd, family, etc)
- Visual Scape (blood, people, etc)

Evaluation Strategy

- Focus on patient rather than environment
- Fact Analysis
- Decision making in the situation provided

Design Strategy

Confidence: Self Image

Spreading their 'light' everywhere they go to signify their power in the situation

Instructional Design

Creating experience to enhance Analysis, Implementation and Decision Making skills

Social Feedback

Words of encouragement by the characters in the scene upon taking correct decisions

Performance Evaluation

Deconstructing the journey and understanding their strengths and weakness

Task Flow

PHASE 1

Introduction & Task call

The EMT is on-boarded initiating him to start with basic level of communication in the staff room, where he receives a task call. As it is a primary level user receives minimum options in order to assess his interpersonal skills.

Tasks
- Reply to call & report to scene
- Select Medical Kit to treat

Skills Tested
Interpersonal skills

PHASE 2

On-site assessment

EMT needs to gaze at the scene to note information on site safety, people hurt and point of contact present. Based on this situational awareness is evaluated, and communication skills with victims family member.

Tasks
- Scene Assessment
- Talk to Patient's family
- Patient assessment

Skills Tested
Interpersonal skills, problem solving & situational awareness

PHASE 3

Transporting and handover

This phase has assessment of patient vitals, signs & symptoms. Inside the ambulance the first course of treatment is evaluated for problem-solving & patient stabilization. EMT needs to report the scene acurately to doctor.

Tasks
- First course of treatment
- Brief the doctor on the case

Skills Tested
Interpersonal skills, problem solving & situational awareness

PHASE 4

Result evaluation of all skills

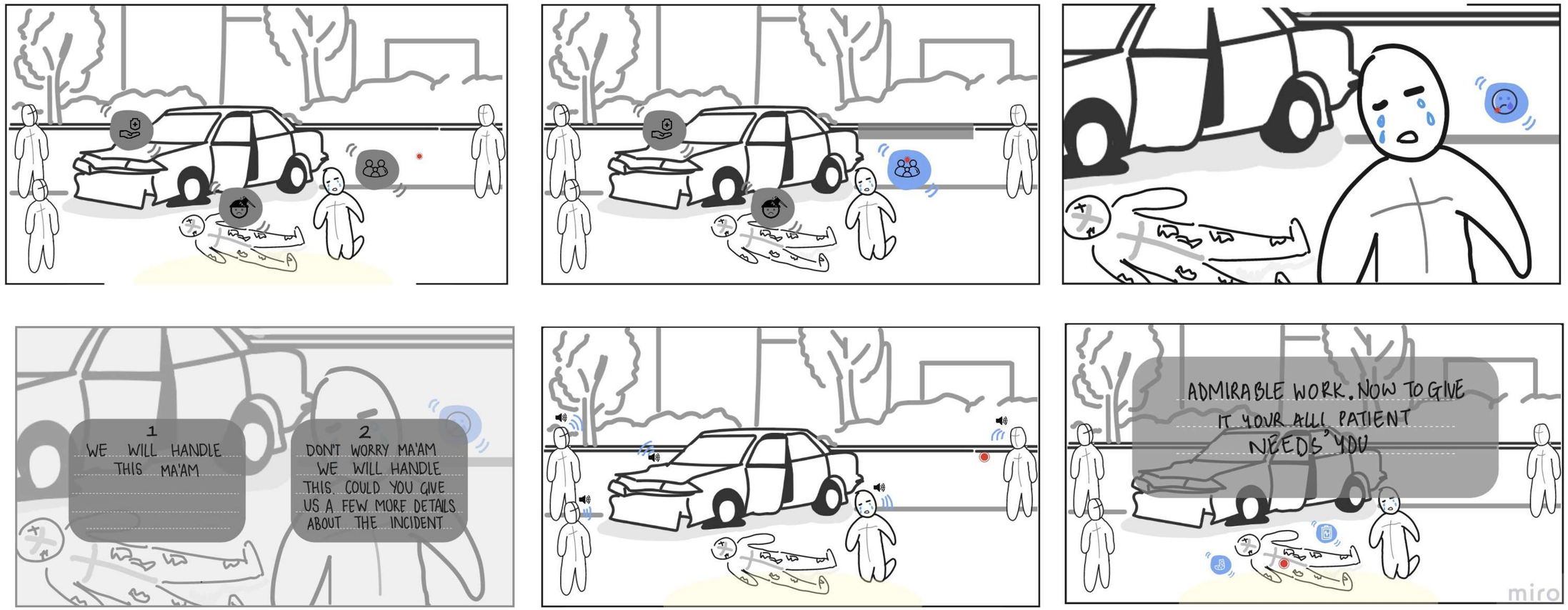
This is a concluding phase where the tasks from previous phases are listed along with skills summary evaluation score and further improvements mentioned

Tasks
- Read through the performance assessments

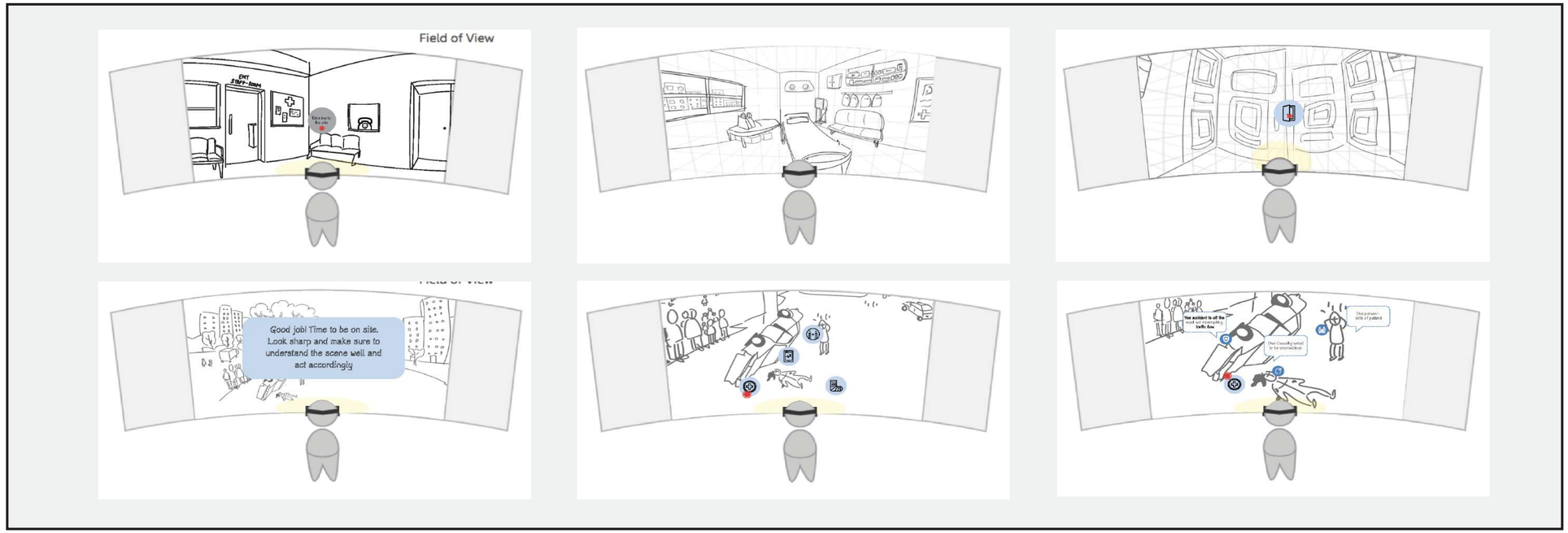
Skills Reviewed
Interpersonal skills, problem solving & situational awareness

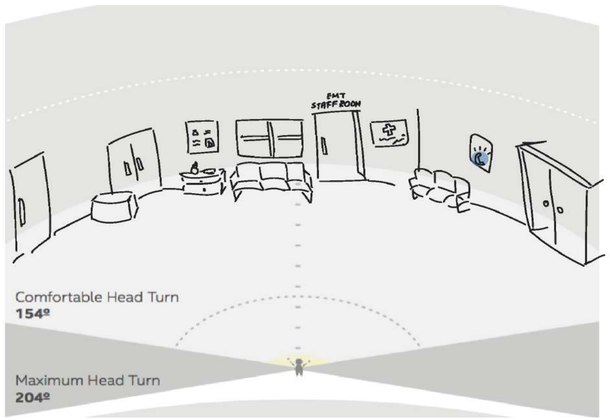
Building the VR environment

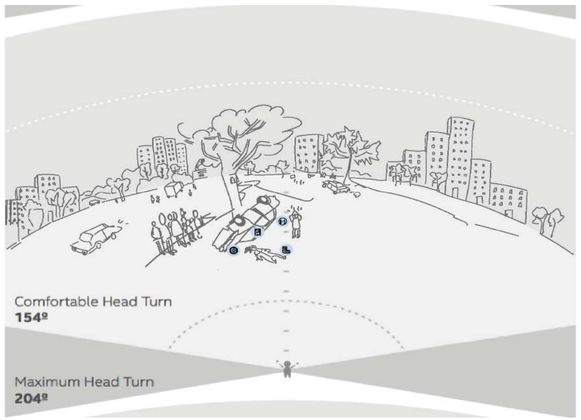
Stage 1: Translating the taskflow into storyboard visuals

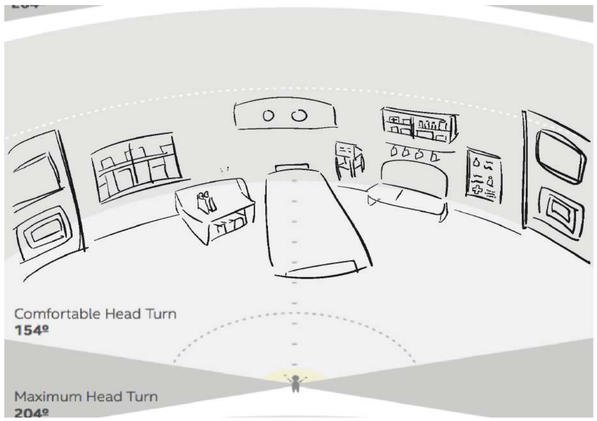


Stage 2: Translating the 2D storyboard into 360 virtual enviroment

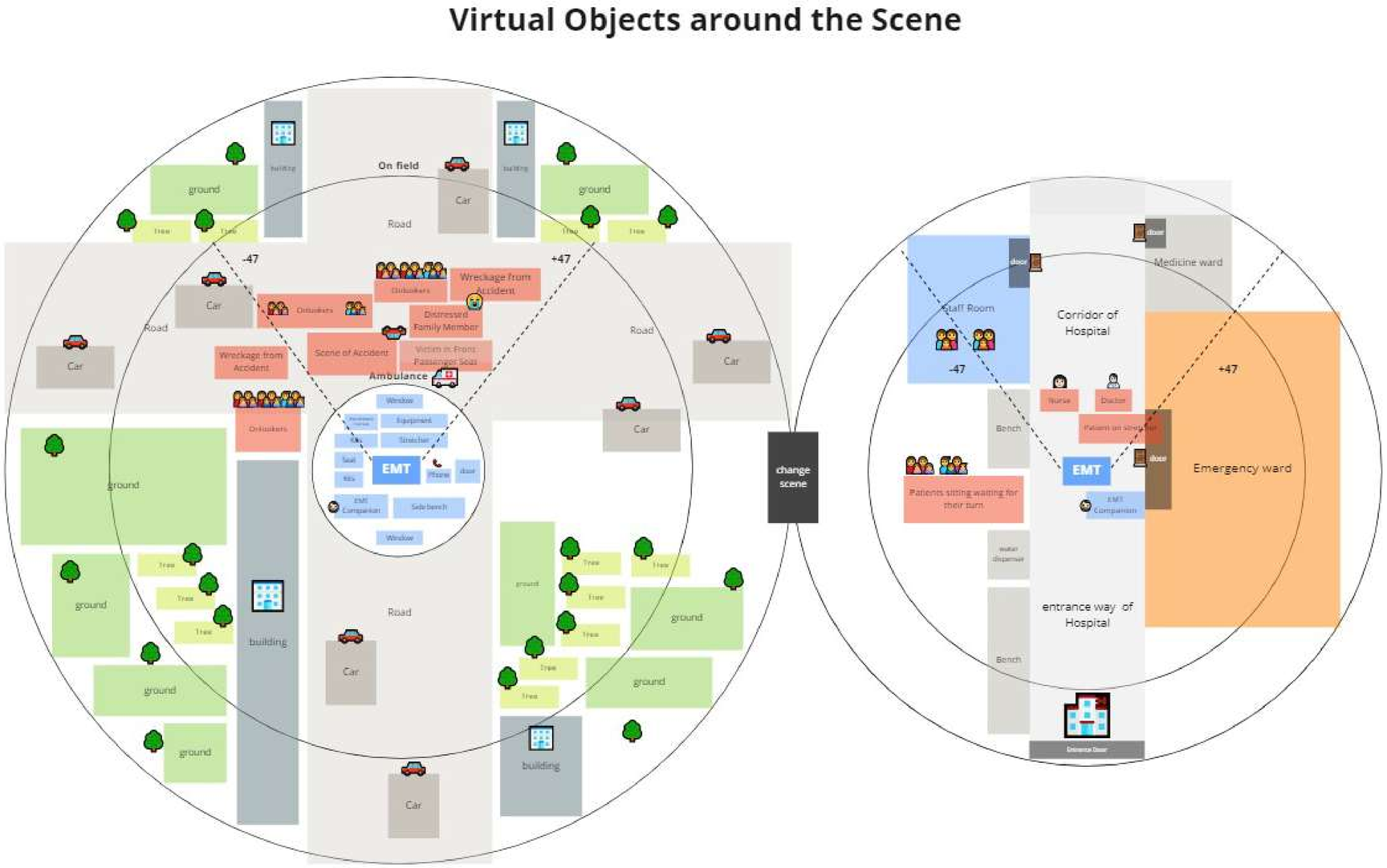




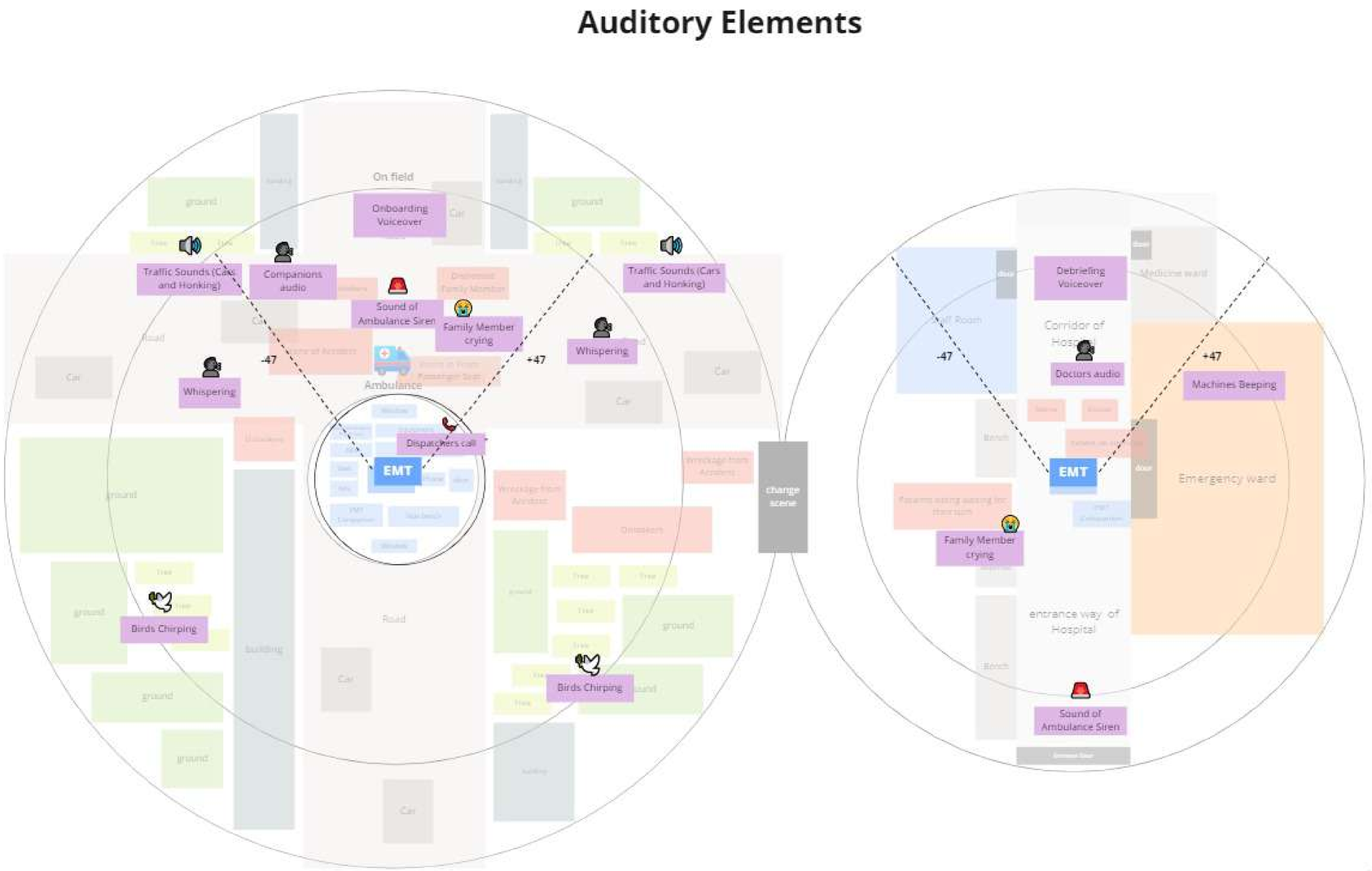




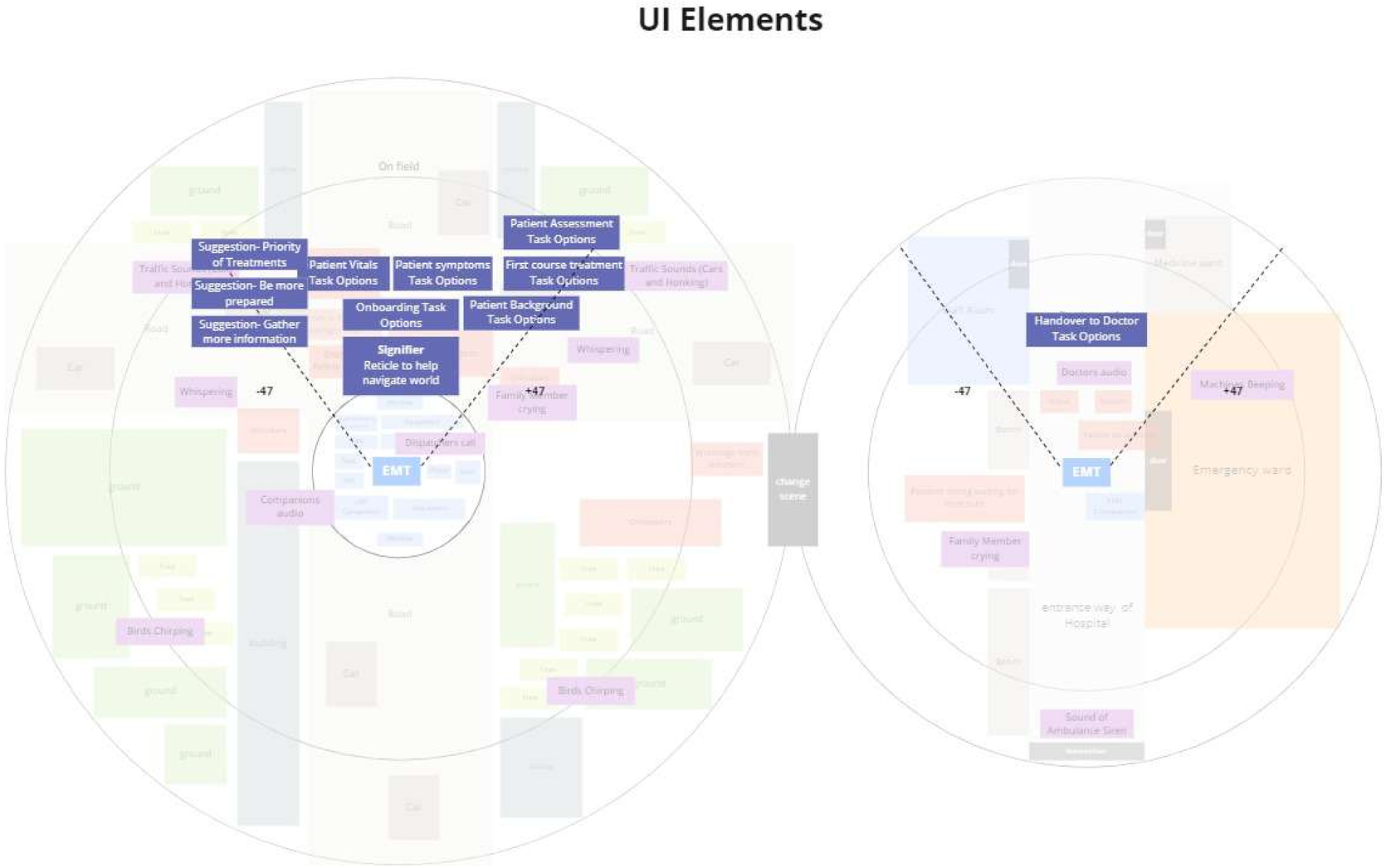
Stage 3: Mapping virtual objects across the environments



Stage 3: Mapping auditory elements across the environments



Stage 3: Mapping UI elements across the environments

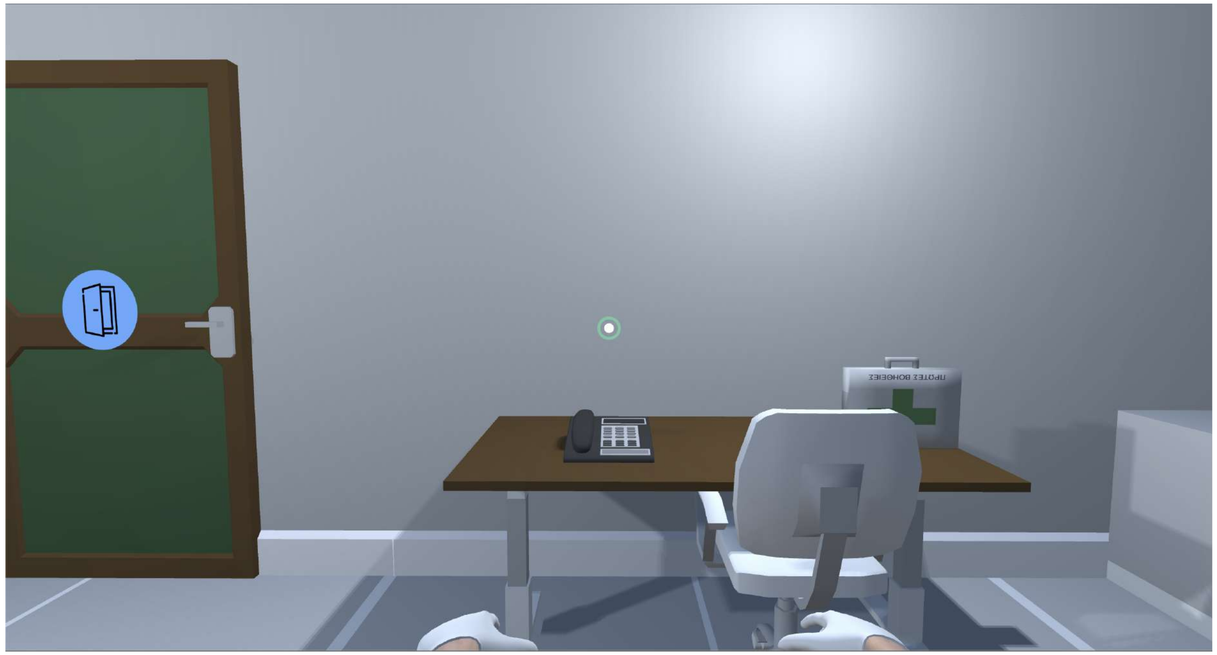


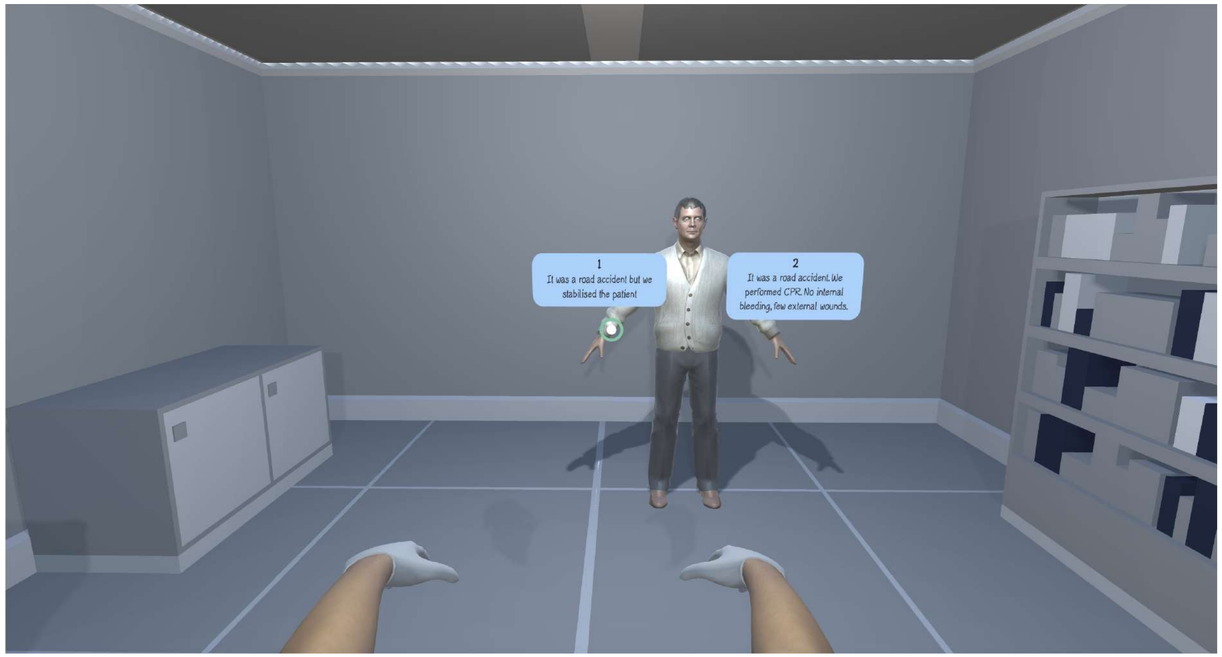
Low-Fi Prototype: Accident Site

Low-Fi Prototype: Inside Ambulance

Low-Fi Prototype: Hospital Staff office

Assets & Elements of the Scene: Hospital Staff office





Scene: Task Call

Characters: -

Lighting: Indoor lighting with focus on the interaction object

Interaction Objects: Telephone

Scene: Debriefing

Characters: Doctor

Lighting: Indoor lighting with focus on the interaction object

Interaction Objects: Doctor Character

Assets & Elements of the Scene: Accident Site

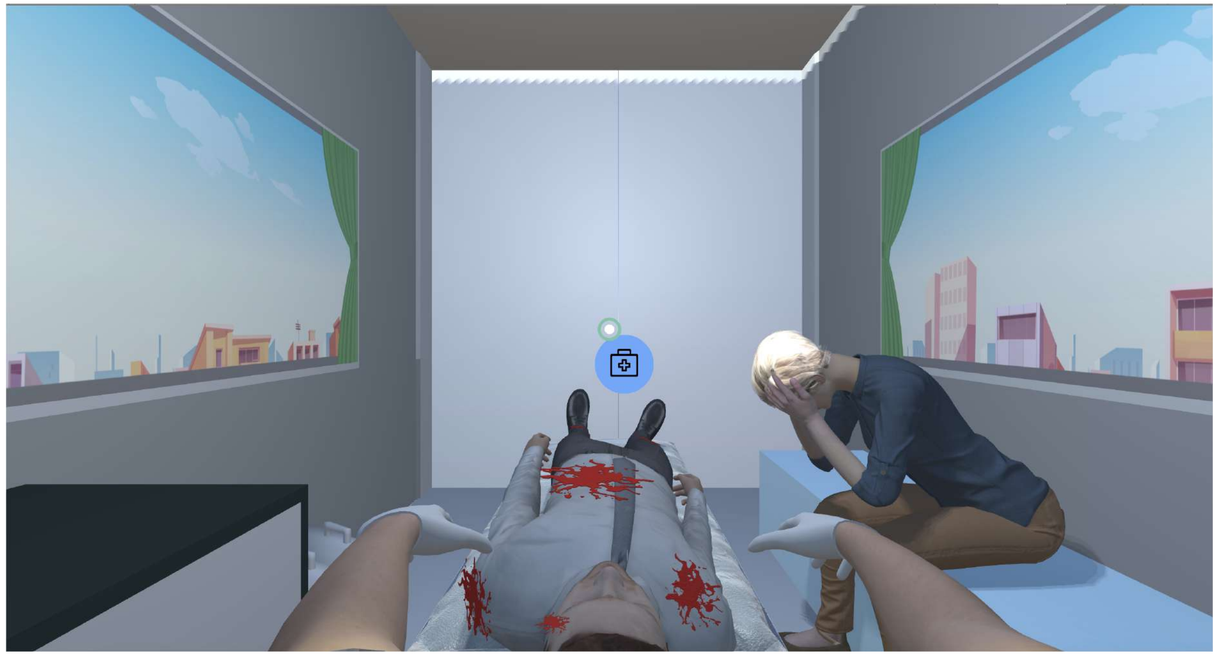
Scene: Site & patient assessment

Characters: Patient, Patient's Wife and Passer-by Crowd

Lighting: Outdoor daylight setting

Interaction Objects: Patient itself

Assets & Elements of the Scene: Inside Ambulance



Scene: First course of treatment

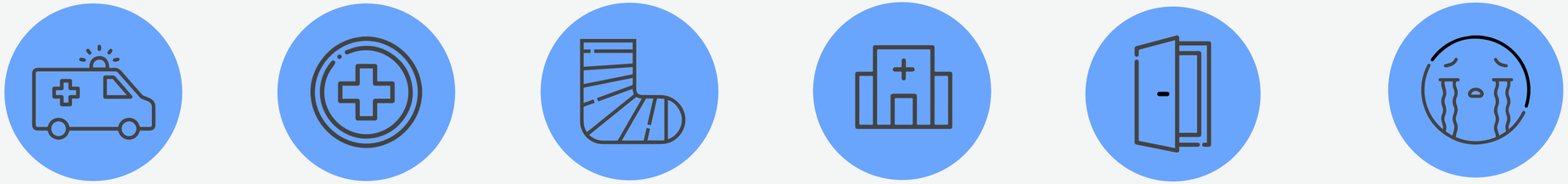
Characters: Patient and Patient's Wife

Lighting: Indoor lighting with focus on the interaction object

Interaction Objects: Patient itself

UI design

Icons



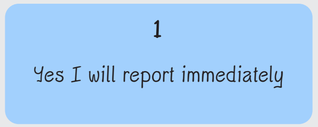
Sub-Options

1	2	1	2
Yes I will report immediately	Could you tell me a bit more about the emergency to prepare better?	We will handle this Ma'am	Dont worry ma'am, we will handle. Could you give us a few more details about the incident?

Highlighted Options

CPR	First Aid for cuts	Support wrist injury

UI design & Interactions

UI Element	Interaction	Feedback
 Icons	Reticle expands when hovers over the UI icon	On gaze options and relevant audios are triggered
 Sub Options	Reticle expands when hovers over an active option	On gaze relevant audios and animations are triggered. Affects the final assessment
 Highlighted Options	Reticle expands when selecting the options in order	Highlights based in the order of selected that triggers an animation

Sound Design

Focus & Out of Focus

UI elements coded to increase environmental sound when focus is not on the patient.

Surround Sound

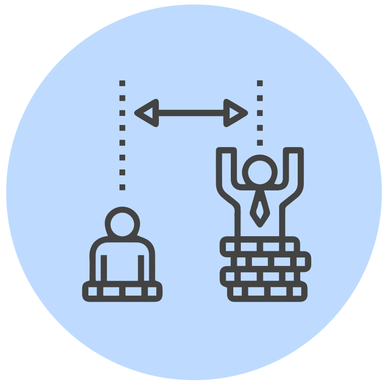
Sounds designed specific for each of the environments as 3D surround sound.

Character Dialogues

Experience guided by a narrator, family member and the doctor character.

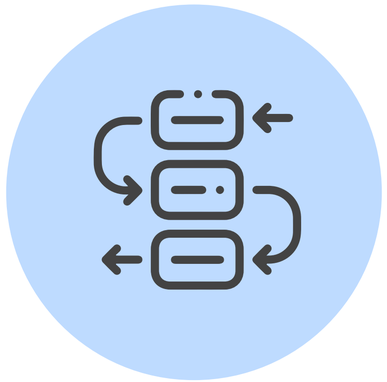
Instructional Design

Pivot Points & Iterations



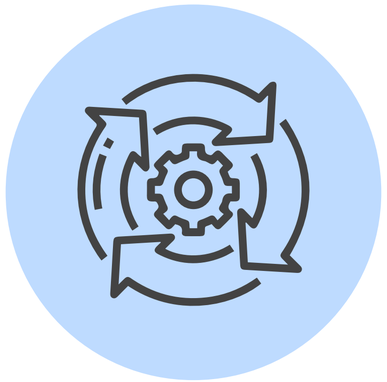
Bridge between the theory and practical training

Activate existing knowledge of the learner; aiding them connect previous knowledge with the new one



Breaking down aspects of complex tasks

Engage with smaller different activities that recall, utilize, and evaluate knowledge with immediate feedback.



Effect of decisions: positive and negative consequences

Demonstrate the knowledge (visually and through story telling) to help them practice and learn from their mistakes

User Testing

20 participants | **Mumbai Suburbs**

Narrative understanding

Performing Series Tasks

Sensory Engagement

Knowledge tested (effectiveness)

What worked?

1. User felt the immersion of being in the high stress environment due to the sound and visual design
2. User could understand the flow of events and activities to be performed

Future Scope

1

Building more scenarios for the EMTs to work with and understand the nuances of.

2

Adding more evaluation aspects and complexity by testing skills such as teamwork, etc.

3

Addition of activities with more user based actions pertaining to different cases.

Impact

Strengthening the medical community by training the first responders (EMTs)

First step towards catering to the mental health of medical professionals (high stress job)

Accustom to practices and beliefs of different cultures and areas in the world