



Floodaid : Management of Urban Floods

Theme: **Design for Crisis**
Rebuild and heal the world with design

Date & Place : 6th August, India

Team: The Core Four



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Our Mentor

Background

Floods are the most frequent type of natural disaster and occur when an overflow of water submerges land that is usually dry. It is caused due to heavy rainfall, tropical cyclones, cloud burst, bursting of dams etc. While there are several different types of floods like, flash floods, coastal floods, river floods, urban floods, etc, they all share one common attribute i.e the potential to wreak havoc. Between **1998 - 2017** floods have affected **2 billion people** worldwide. There have been **285 reported flooding events in India** over 1950-2017 affecting about **850 million people**, leaving **19 million homeless** and causing the deaths of about **71,000 people**. Thus, the damage and impact of floods is varied, substantial and far reached.

“

"Every purchase was like a milestone for me - the cycle, the bed and the chairs. But now nothing is left. The flood took everything away from me,"

-Assam flood victim



Problem Identified

PROBLEM AREA

Urban pluvial (surface water) flooding i.e flooding in urban areas caused by intense and/or prolonged rainfall which overwhelms the capacity of the drainage system. There has been an increasing trend of urban flood disasters in India over the past several years whereby major cities in India have been severely affected.

PROBLEM STATEMENT

To design a solution which can help the victims of the urban flood in areas of awareness and preparedness, effective management (communication, commute aspects) and also in mitigating post crisis problems.

FOCUS

Our main aim is to deal with the crisis of urban floods at a personal level by designing a solution that will help individuals by providing means through which they can be better prepared and help themselves as well as the immediate community during the time of the crisis.



Urgency/Importance

34 million

Indians would be at risk for riverine flooding by 2030

\$60 billion

Total losses from flooding events from 1950 - 2017 in India

8 times

Increase in the volume of floods because of urbanization

WHY FLOODS ?

- Floods are the most common and widespread of all weather-related natural disasters. They are responsible for almost half of the mortalities due to extreme weather events. Globally, floods made up to 47 percent of all climate-related disasters from 2006 to 2015, up from 40 percent in the 1996-2005 period.
- Floods are increasing in frequency and intensity, and the frequency and intensity of extreme precipitation is further expected to continue to increase due to climate change. The number of floods in India rose to 90 in the 10-year period from 2006 to 2015, up from 67 in the 10 years between 1996 to 2005, according to the UN Office for Disaster Risk Reduction.
- At one point, an estimated 1.2 million people were living in government relief camps after widespread flooding. Experts say this is a sign that despite improved warnings and response, India needs to do more to reduce risk.



WHY URBAN FLOODS ?

- Urban flooding is significantly different from rural flooding as urbanization leads to developed catchments (increased risk of waterlogging), which increases the flood peaks from 1.8 to 8 times and flood volumes by up to 6 times. Thus, flooding occurs very quickly due to faster flow times.
- Urban areas are densely populated and people living in vulnerable areas suffer due to flooding, sometimes resulting in loss of life. They are the centres of economic activities with vital infrastructure which need to be always protected.
- There has been an increasing trend of urban flood disasters in India over the past several years wherein major cities in India have been severely affected. The most notable amongst them are Hyderabad in 2000, Delhi in 2002 and 2003, Chennai in 2004, Mumbai in 2005, Kolkata in 2007, Jamshedpur in 2008, and Guwahati in 2009.
- Even though urban flooding has been experienced over decades in India but sufficient attention was not given to plan specific efforts to deal with it. In the past, any strategy on flood disaster management largely focused on riverine floods affecting large extents of rural areas.

Thus, it is important to take immediate action towards the management of the urban floods crisis in order to reduce the physical as well as emotional damage caused by it.



Our Interviews:

We conducted In-person and telephonic interviews of people staying in different flood affected and flood prone cities.

The states highlighted are the most flood affected and flood prone Indian states since the last decade. Hence, we selected our interviewees from these areas.

Our main goal was to get real narratives, stories and experiences and thus to get a better, qualitative view of the crisis situation.

12+

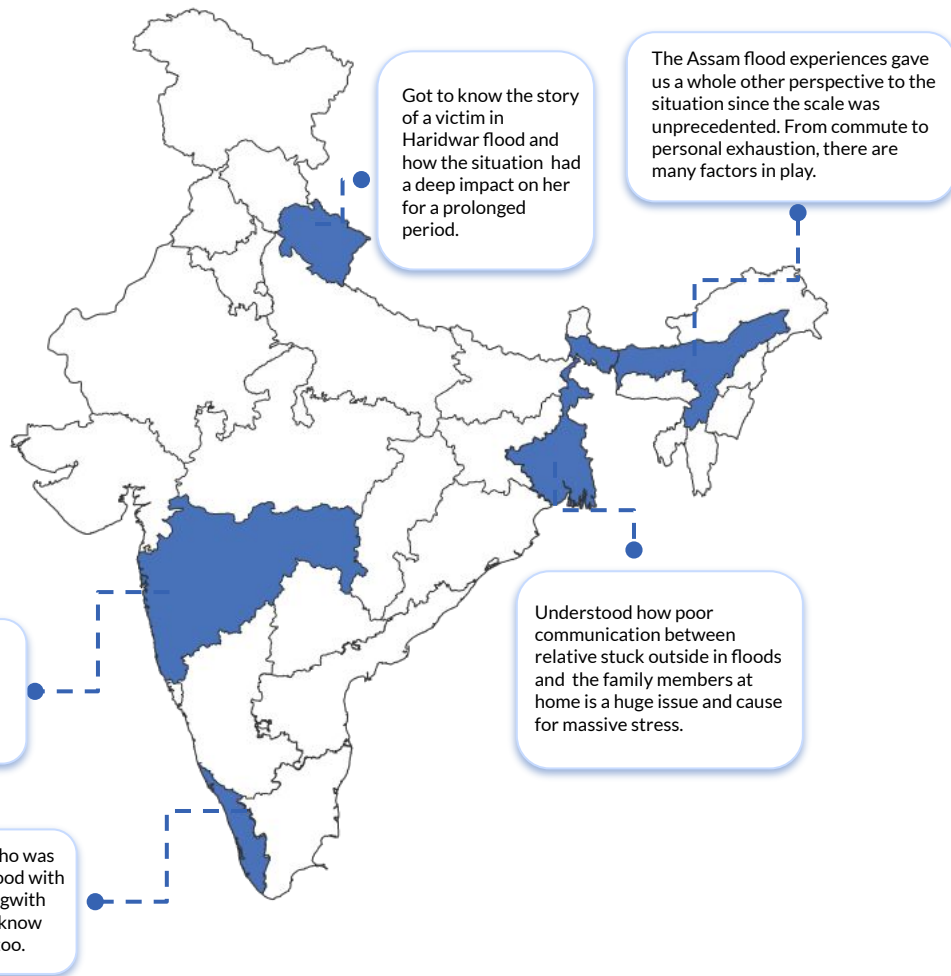
People interviewed

Target Audience-

People affected by floods in the age group 20-50 years

Reason -

The age-wise analysis of the deaths shows that the majority of deaths due to floods were reported in the age group of 25-50 years according to a study.





Age: 26

Gender: Female

Job Title: Intern

Family setting:

Lives in a modest house in the suburbs in a joint family in Kochi.

Prachi Shah

Target User Persona 1

"I am an intern at a firm in Kochi, Kerala. I still remember the crisis situation when the floods hit majority of Kerala in 2020. We were stuck inside home for over 2 days and we are still recovering from the physical and mental damages caused by the crisis."

Goals and Values

- To ensure all family members are safe.
- To manage water, food resources properly to ensure they don't run out.
- To try that there is a minimal loss of important property.
- To make rational decisions and not panic unnecessarily.
- To help the community in these times of need.

Pain Points

- No connectivity; thus difficulties in reaching to family/ friends stuck outside the house.
- No electricity; hence difficult to manage especially during nighttime.
- Post flood management, dealing with property damage etc.
- Lack of preparedness about this flood situation.

Feelings

- Stressed due to multiple factors-the emergent situation, continuous rumors and mass panic, about the well-being of family members etc.
- Frustrated due to the mismanagement of the authorities.
- Overwhelmed by the continuous stimulus and decision making.

Traits/Skills

- Tech-savvy.
- Efficient in management and team collaboration.
- Volunteers in many NGOs.



Age: 45

Gender: Male

Job Title: Software Engineer

Family setting:

Lives in a flat in a society in Mumbai city with wife and 2 kids.

Rajesh Joshi

Target User Persona 2

"I am the department manager at a software firm in Chembur, Mumbai. During the Mumbai floods, after being stranded in the office for hours, reaching home was another major struggle. With obstructed commute and rising panic amongst the public, every minute was full of worry and anxiety."

Goals and Values

- To reach home safely during the flood situation.
- To be in regular contact with family members during the crisis.
- To know the line of action to be taken and overall preparedness to tackle such situations.

Feelings

- Continuous panic due to disturbing external stimuli.
- Being exhausted mentally as well as physically.
- Incessant fear regarding overcoming this situation.

Pain Points

- Not being aware about the danger zones and not getting reliable updates.
- Scared of falling ill post floods.
- Not getting proper transportation facilities
- Stranded in unknown locations with strangers.
- Waiting desperately for getting timely help.

Traits/Skills

- Tech-savvy.
- Has knowledge about different fields apart from his specialization.
- Passionate photographer and blogger.



Age: 52

Gender: Male

Job Title: Shop Owner

Family setting:

Lives in a small flat above his shop in a joint family in Chiplun.

Anil Shah

Target User Persona 3

"I own and run a grocery and wholesale shop in Chiplun, Konkan. The Chiplun flood crisis was one of the devastating moments of my life as I had to see the business I had built come to a standstill and belongings, property getting destroyed. However, my community helped me during these times of helplessness."

Goals and Values

- To minimise financial loss and destruction of resources.
- To make insurance, business, property arrangements beforehand.
- To keep oneself, family as well as the shop workers safe and sound.

Feelings

- Experience of shock by the sudden impact on business.
- Post crisis stress caused by the damage.
- Feeling of added responsibility.

Pain Points

- Making difficult decisions in limited time frame.
- Lack of preparedness w.r.t shifting of goods, stock storage and other allied decisions.
- Not getting enough support from authorities and not knowing what actions to take subsequently.
- Additional financial burden faced due to losses.

Traits/Skills

- Has basic technology knowledge.
- Efficient in interpersonal relations; highly empathetic to others needs..
- Classical music enthusiast.

User Journey Map



Rajesh Joshi

Age : 45

Location : Mumbai

Occupation : Software Engineer

Family setting : Lives with his wife and two kids in a flat in Mumbai city.

Scenario







Rajesh is the department manager at a software firm in Chembur, Mumbai. During the Mumbai floods of 2019, after being stranded in the office for hours, reaching home was another major struggle for him. Obstructed commute, waterlogged roads and overall unpreparedness further added to the stress during the crisis.

Expectations

To reach home safely during the flood situation.

To be in regular contact with family members during the crisis.

To be aware of the precautions to be taken in order to be prepared and tackle the situation.

Stages	Stranded in the office	Leave for home	During commute	Reach home	Post crisis days
Tasks	<ul style="list-style-type: none">• Checking news, social media updates about the crisis continuously• Rationing the supplies available- food, water, light source	<ul style="list-style-type: none">• Checking train schedules, looking for public transport nearby• Searching for cabs online	<ul style="list-style-type: none">• Changing modes of transports in order to reach home and calling NGOs for help.• Walking in waterlogged streets for several miles to reach home.	<ul style="list-style-type: none">• Realizing that important documents & electronic devices have been damaged and trying to restore them.	<ul style="list-style-type: none">• Falling sick due to coming in contact with germs and getting drenched• Managing the losses faced in terms of personal possessions
Thoughts	"These rains caught me so off-guard. How will I know the exact on-ground situation? Is it safer to stay here or leave for home?"	"Due to network issues, I am having trouble finding the mode of commute. I am not aware if the trains are operable or not."	"I am stressed out since I can't communicate with my family and let them know my status. How will I know which roads are operable and not blocked by trees etc.?"	"While I am thankful for getting home to my family and safety, I am very exhausted physically and mentally from the ordeal."	"I am still recovering from the losses, However I am also frustrated with the management of the flood by the authorities."
Emotions				 	
Opp.	<ul style="list-style-type: none">• Availability of emergency kits containing essentials for such crises.• Source for reliable news and updates.	<ul style="list-style-type: none">• Displaying live locations and status of public transport.• Awareness about nearby NGO shelters who make commute arrangements.	<ul style="list-style-type: none">• Displaying waterlogged areas and other danger zones.• Steps to take during crisis.• Something to convey the victim's location.	<ul style="list-style-type: none">• Supportive measures, helpline numbers.• Knowing how to support the victims and also cope with the continued emotions.	<ul style="list-style-type: none">• Knowing the precautions to be taken to prevent any serious health issues.• Making aware of the next steps to be taken (official proceedings wise etc.)

Competitive Analysis

Competitive analysis was conducted to analyse the features of applications that already exist in the market

Features	Kashmir Flood Alert	Flood Near Me	Pegel Alarm	Sangli Flood	Readi
1. Accurate prediction features	●	●	●	●	●
2. Visual graphs/data	●	●	●	●	●
3. To do's/not to do's	●	●	●	●	●
4. Checklists- things to carry, precautions to take	●	●	●	●	●
5. Waterlogged streets, blocked roads	●	●	●	●	●
6. Trains, public transport status+ nearby available transport	●	●	●	●	●
7. Pop up alert on mobile	●	●	●	●	●
8. Location tracking	●	●	●	●	●
9. Send emergency location, SOS to family members, police and emergency services, ngos	●	●	●	●	●
10. Helpline numbers, see locations of ngo shelters	●	●	●	●	●
11. Donation	●	●	●	●	●
12. Emergency Contacts	●	●	●	●	●
13. Danger Zones	●	●	●	●	●
14. Waterlevel of nearby waterbodies	●	●	●	●	●
15. Pan Country Application	●	●	●	●	●
16. Live Announcements	●	●	●	●	●
16. Paid	●	●	●	●	●

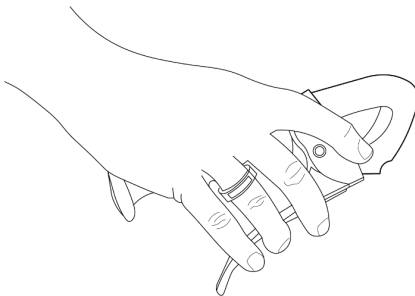
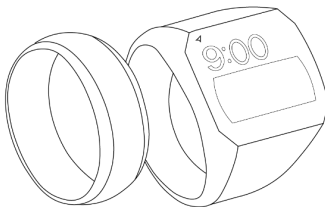
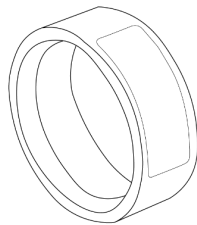
Explorations

We did ideation and thought in different perspectives by brainstorming on key problems, one minute ideas, wild ideation and lots of sketching.

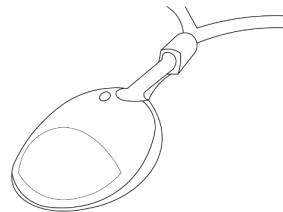
Then we explored in terms of -

- GPS Tracking
- Bluetooth
- Led display
- Emergency contacts connection
- Waterproof material
- Health tracker
- Microphone

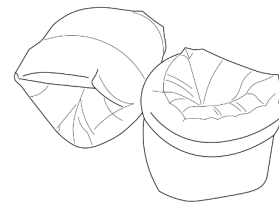
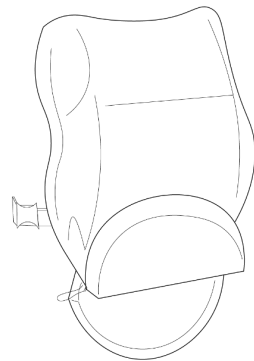
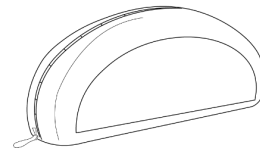
Smart Rings



Pendants



Floater

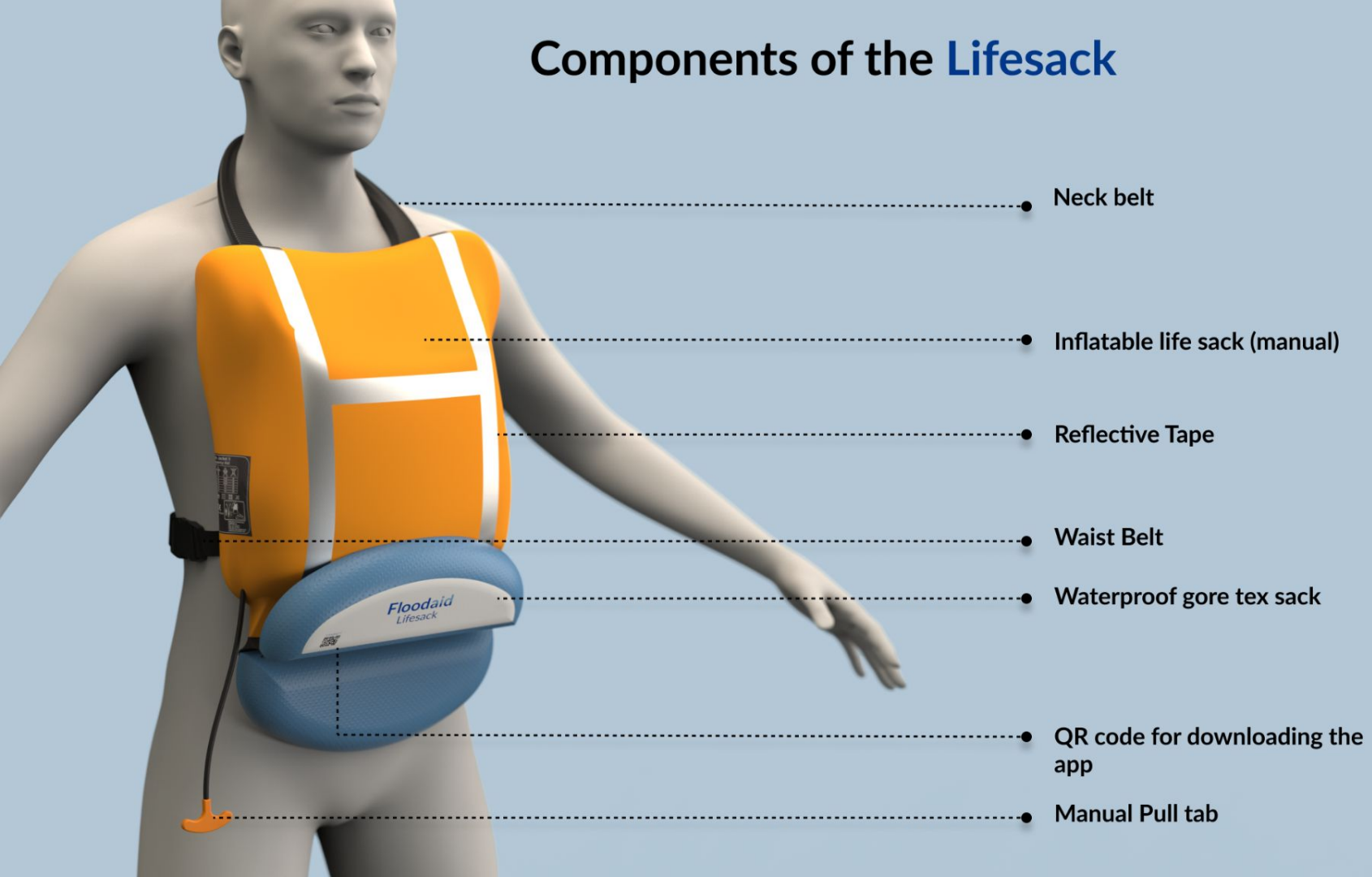


Final Solution

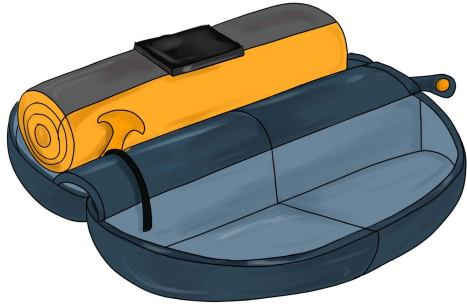
Floodaid is an integrated solution comprising of a mobile application and a tangible product - 'Lifesack', designed for mitigating urban flood crisis. The Lifesack comprises of a compact bag containing an inflatable life jacket (can be used to safely travel through waterlogged streets) and activated GPS chip which is connected to the application. In addition, the Lifesack can securely store user's valuables. The Lifesack along with the application will help users in managing the flood crisis situation smoothly and effectively.



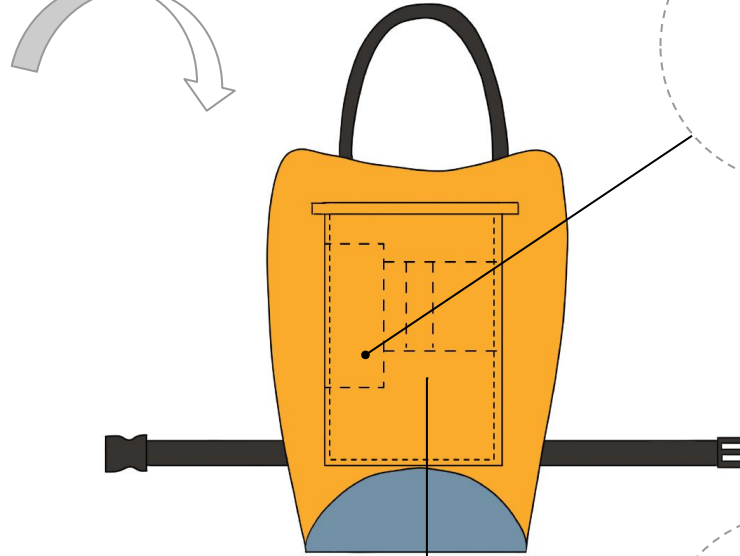
Components of the Lifesack



Lifesack Features



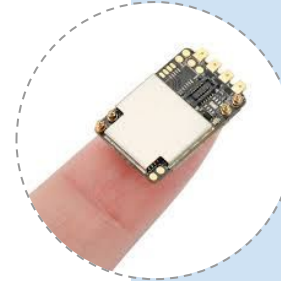
- The lifesack has a **compact** organic form.
- The lifejacket can be **rolled** and easily stored inside the sack along with the belts and GPS chip.
- When you unroll it, you can store the **documents** and valuables in the backside of the lifejacket which is waterproof.
- The zippers are also waterproof so everything would be safe inside.



Foldable Bottle-
Soft material, occupies less space



Waterproof Zipper-
The zipper flaps are made with nylon.



GPS tracking chip-
A micro GPS chip is installed to track its wearer during commute. It is placed inside the waterproof compartment

Four page brochure (folded and kept inside the Life Sack)


Floodaid

User manual


Please read and follow the given steps carefully


STEP 1

Scan the QR code below and download our app



OR


GET IT ON
 Google Play

Download on the
 App Store


AND
Sign in

STEP 2


Preparing the lifesack while in emergency




Place the sack in front of you




Open the zip of the sack




Unroll and unzip the life jacket and put valuables inside



Wear the jacket over your neck and tighten the waist belt




Pulltab in downward direction which will inflate the life jacket




Stay Safe !


Safety instructions




Do not put any sharp objects in the compartments




This App and Lifesack is for 16 years and above



Ensure that the compartment zippers are fully closed before stepping out



Please allow the App to access your contacts and location.



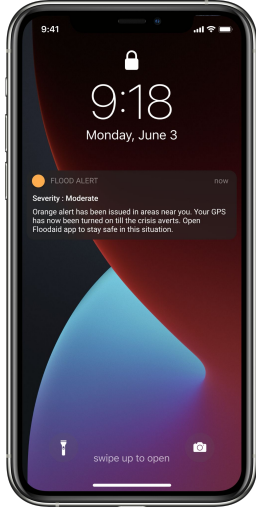
The CO₂ cylinder inside the vest lasts for 3 years, considering less to moderate usage

Safety instructions

Application Features

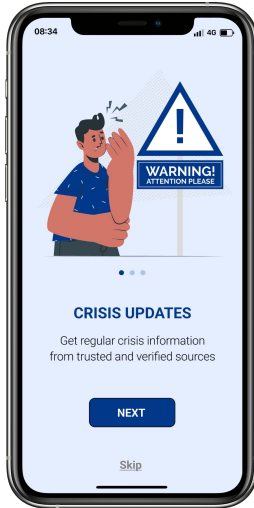
FLOOD ALERT

The app will notify the users incase a flood warning is issued nearby. The severity of the flood will also be mentioned in the notification. The sound of this notification will be different from the others



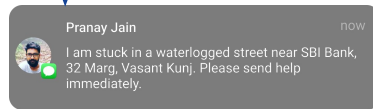
ONBOARDING

Onboarding tutorial which will help users to navigate through the app easily. The app will have a one step login process through OTP in order to allow users to open the application quickly in case of emergency



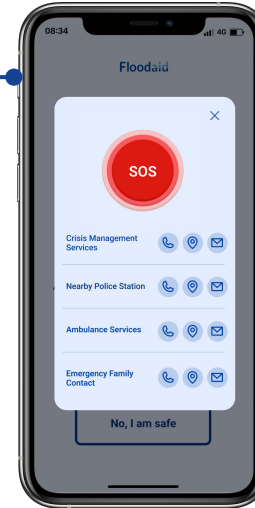
SOS FEATURE

SOS numbers will be displayed and the users can either call, send location or message them. The message that will be sent to the emergency numbers will have the user's location



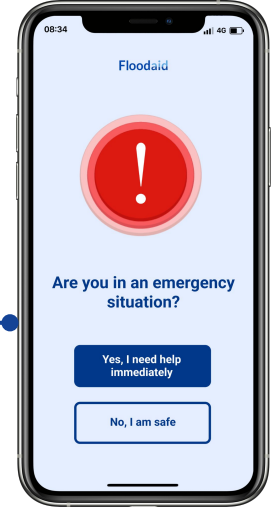
FLOOD INDICATOR

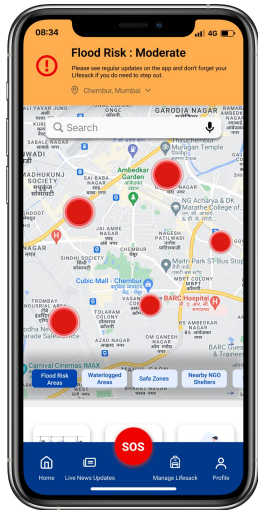
The colour of the top navigation bar will remain red, orange or yellow depending upon the severity of the flood until the flood warning is withdrawn so that the users remain aware of the situation.



SOS FEATURE

In case the users are in an emergency situation and need help immediately, the app will allow them to skip the Sign up process and access the SOS feature to call for help without wasting any time.



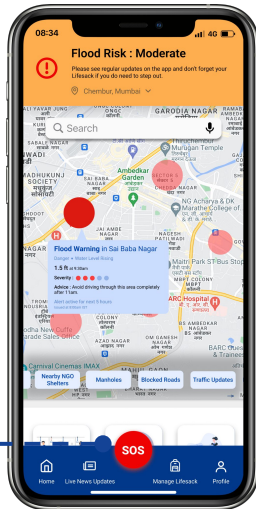


MAP FEATURE

The app will display the location of nearby flood risk areas, NGOs, waterlogged streets, blocked roads, traffic updates, safe zones, manhole so that the users know which route to take in order to commute safely.

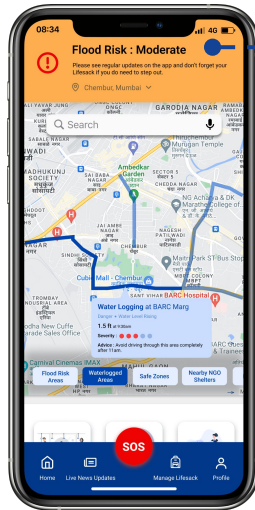
SOS BUTTON

The SOS button will be placed in the bottom navigation bar so that users can access SOS feature without any delay during emergency.



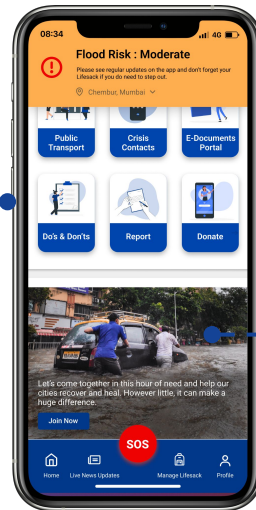
HOME SCREEN

Buttons to important features like viewing updates on public transport, crisis contacts, e- documents portal to keep all important documents at one place in case the original ones get damaged, lodging missing reports and donating fund to help the community are placed on the home page for easy access



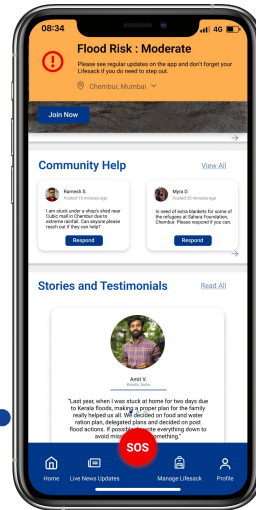
HOME SCREEN

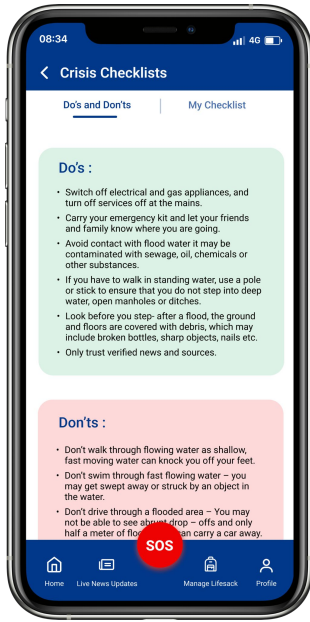
The flood warning along with the location will be displayed on the home screen. The app will notify the users and activate GPS tracking and share the user's location with the emergency contacts as soon as the warning is issued.



HOME SCREEN

The app will have a community help feature where the users can post their requirements and receive help from the community. Stories & Testimonials will be displayed so that the users understand the plan of action in case they are in the similar situation. Users can also sign up for volunteering during the crisis.





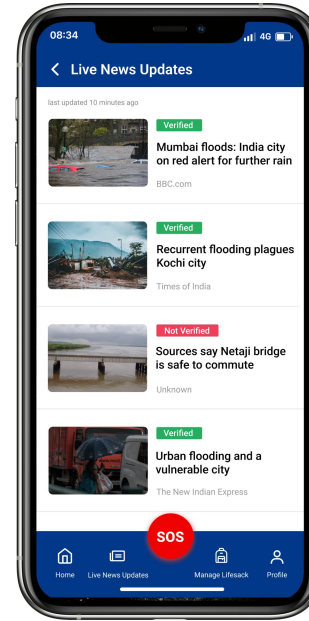
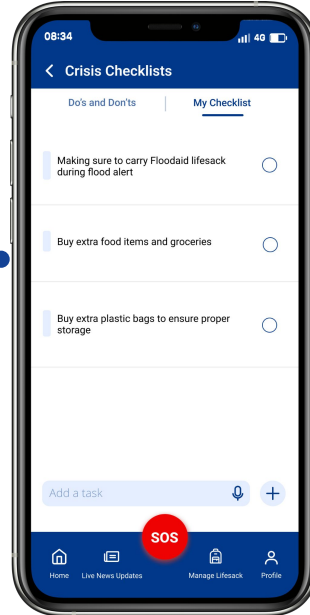
DO's & DON'Ts

A list of Do's and Don't will be displayed so that the users know the steps to be taken and can access the list anytime since many users are not aware of what to do when a flood situation arrives



CRISIS CHECKLIST

The app will also allow users to create a personalised checklist of things to do during the crisis situation and send reminders accordingly so that they do not forget anything important



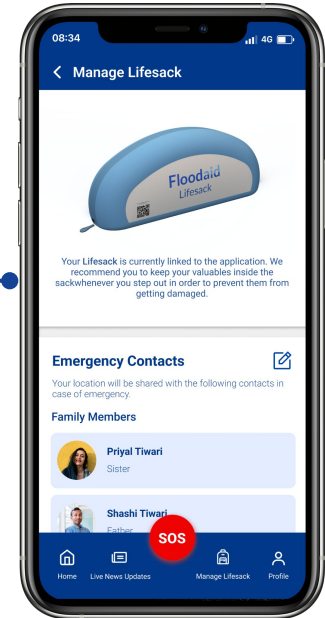
NEW UPDATES

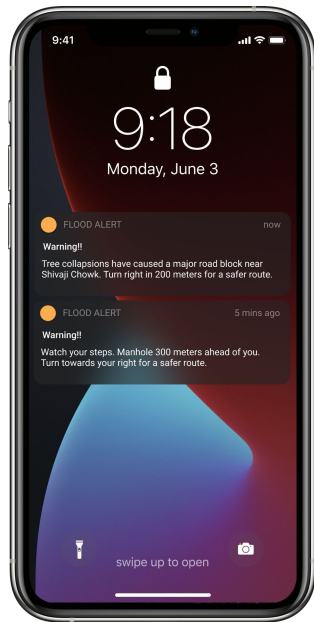
The app will notify the users in case of any important news announcements. It will also verify the news updates in order to prevent the panic that is caused due to fake news during the crisis



MANAGE LIFESACK

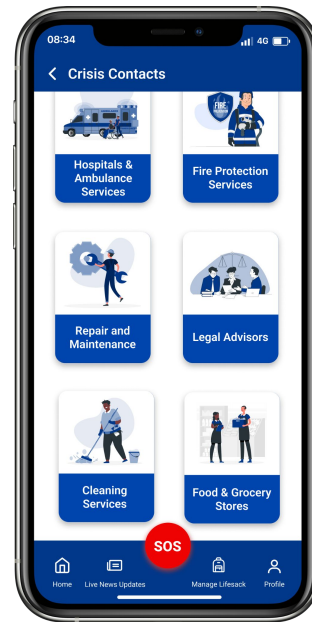
The app will be linked to the Lifesack with the GPS chip after scanning. The user's location will be shared with emergency contacts during the crisis so that the user can stay in touch and communicate in case there is no network connectivity





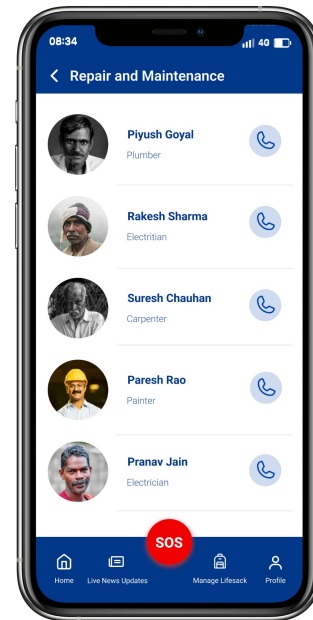
NUDGING

The app will notify the users in case there is a manhole, waterlogged or blocked street ahead. It will also redirect the users to a safer route in order to help them commute safely



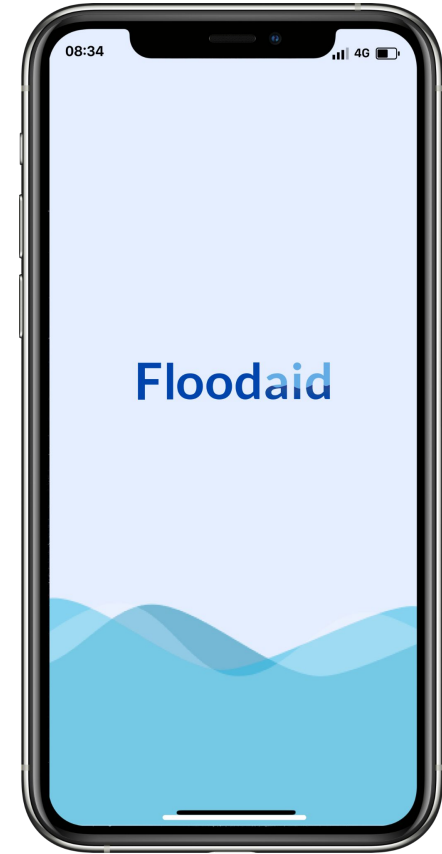
CRISIS CONTACTS

The app will display contact details of plumbers, electrician, cleaning services and legal advisors to help in cleaning, repair and restoration post floods



User Experience

- Illustrations and Infographics have been used which will make it easier for the users to perceive and understand the actions to be performed.
- The use of jargons have been avoided and the terminologies used are easy to understand.
- Reducing the number of steps taken to perform any action (For example - one step login process) in order to increase the efficiency and reduce the time taken, since, the application is a crisis application
- The colours used are such that they match the mental model of the users i.e red for severe alert, orange for moderate alert and red for emergency button.
- Since, the application is to be used during crisis the UI is simple, intuitive and consistent to help users navigate through the application easily.
- The users have been provided with an option to undo their actions whenever necessary. Pop ups and disclaimers are displayed for confirmation in order to avoid errors.
- The Lifesack and the accompanying life vest are easy to use and handle. The lifevest has a neon orange colour for better identification. A visual manual will also be included with the product to better guide the users.



Design Process



DISCOVER

Desk Research

It helped us in gathering baseline information and understanding the domain/problem area better

User Interviews/ Observations

They were conducted to understand the user's needs, behaviour, feelings and opinions in order to reach to the problem statement



DEFINE

User Personas

Personas helped us in mapping down the findings from the primary research and understanding the user's needs, goals and frustrations

Journey Map

It helped us in compiling the user's actions into a timeline and identifying their pain points and emotions

Competitive Analysis

It was used to analyse the features of the competitors in the market

Problem Statement

The problem statement was articulated based on the insights from the research



IDEATE

Brainstorming

Ideas were generated to solve the problem identified

Affinity Mapping

It helped us in organizing the ideas generated during the brainstorming session under broad categories

Business Model

It helped us identify sources of revenue, the intended customer base, products, and details of financing.



PROTOTYPE

Wireframes

Low & Mid Fidelity Wireframes were made to visualise the solution- i.e app screens

High Fidelity Screens

High Fidelity Screens were designed for a life-like representation of our final solution

CAD modelling and renders

CAD model was designed to visualize the tangible product. Then it was rendered with realistic materials.

Impact on the Society

Our solution **ensures preparedness** during this time of crisis and helps users manage their valuables as well as overall **navigate through such panic situation**.

The life vest inside the Lifesack instills a **sense of safety and reassurement** in the user especially during severe waterlogging conditions.

Rebuilds gap of communication by always ensuring the flood victims' location is visible to their emergency contacts.

Helps alleviate the feeling of post-crisis helplessness by providing necessary resources within the app.

Helps create a **Social impact** through donation and volunteering options.

All in all, Floodaid will help users of the usually fast-paced cities better **tackle the crisis and face as less losses as possible**.



Sustainability

The Lifesack is made up of only one material - gore tex, a typically used waterproof material for raincoats and umbrellas. The life jacket inside is made up of nylon fabric. Both nylon and gore tex are recyclable. The inflatable life jacket is more environment-friendly compared to the traditional PVC foam life vest, since PVC foam exploits about 47% of world's precious natural resources.

The inflatable life vest uses only CO₂ gas, which comes in a cylinder and has a life of 3 years. After 3 years, the cylinder can be replaced from the nearby service center, making the Lifesack a long lasting and durable product.

These life vests can be mass manufactured, using cutting machines, and by using less natural resources. The Lifesack is a compact structure, occupies less space during transportation, thus using less fuel.

Studies show that urban flooding is going to be a recurrent phenomenon, making Floodaid extremely useful in the long run.



Practicality & Business Viability

Key partners

What are your key partners to get competitive advantage?

Media
(News updates)

NGOs

Google Maps
(GPS tracking)

Counsellors
(Flood revival)

NDRF

Payment applications
(donations)

Emergency services

Weather forecasting department

Key activities

What are the key steps to move ahead to your customers?

The product will come with a scannable QR Code, which will give users full access to the integrated app.

Key resources

What resources do you need to make your idea work?

Accurate forecasting data

NGO & community support

Key propositions

How will you make your customers' life happier?

Providing an all inclusive app

A well thought guide

Users can check if their family members are safe

There is a section for community support

Customer relationships

How often will you interact with your customers?

Daily communication and updates will be given to users during crisis

Contact will be maintained even in the post crisis time, when a lot of mental support is needed

Customer segments

Who are your customers? Describe your target audience in a couple of words.

People in the age group of 20-50 years

People living in frequently flooded/flood prone urban areas

Channels

How are you going to reach your customers?

The product will reach to the users first, through NGOs/ supermarkets/ E-commerce platforms. The app will be downloaded thereafter.

Campaign's, hoardings, posters etc.

Digital Marketing

Cost Structure

How much are you planning to spend on the product development and marketing for a certain period?

Rs 500- 700 (estimated) on the lifesack

The App is complementary to the Lifesack, and would be Ad-free. For the users who don't purchase the sack, would get ads on the App.

Revenue Streams

How much are you planning to earn in a certain period? Compare your costs and revenues.

Donations- government, third party and community donations

References/Links:

- <https://ndma.gov.in/Natural-Hazards/Urban-Floods>
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Thank you!