

Evacuations in
Natural Disasters

CONTENTS

| | | | |
|---|-------------------------|-------|--|
| | | | |
| 1 | FRAMING | 1 | |
| - | Background | 1 | |
| - | Process | 3 | |
| - | Research Plan | 4 | |
| - | Defining the problem | 5-6 | |
| 2 | SECONDARY RESEARCH | 6 | |
| - | Stages of Evacuation | 5-11 | |
| - | Vulnerable Individuals | 12-13 | |
| - | Key Insights | 14-15 | |
| 3 | PRIMARY RESEARCH | 16 | |
| - | Discovery Interviews | 19-20 | |
| - | Expert Interviews | 20 | |
| 4 | SYNTHESIS | 24 | |
| - | Affinity Map | 25 | |
| - | Journey Map | 26-29 | |
| 5 | OPPORTUNITY | 30 | |
| - | How Might We | 32 | |
| - | User Needs | 33 | |
| - | Prototypes & Next Steps | 34-35 | |
| 7 | APPENDIX | 36 | |

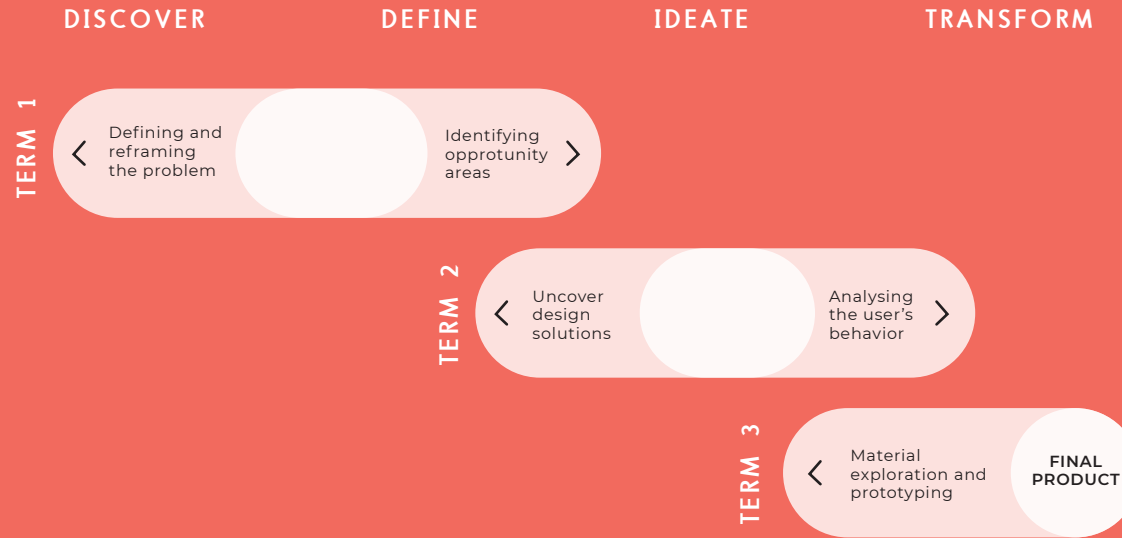
BACKGROUND

Summer of 2021 marked another historic season of devastating wildfires for Greece. Video footage emerged of the Greek island Evia burning coastline to coastline, reaching up to 120,000 acres burned. This disaster killed hundreds of wildlife, and left many Greek's homeless and with little to no hope of recouping their losses.

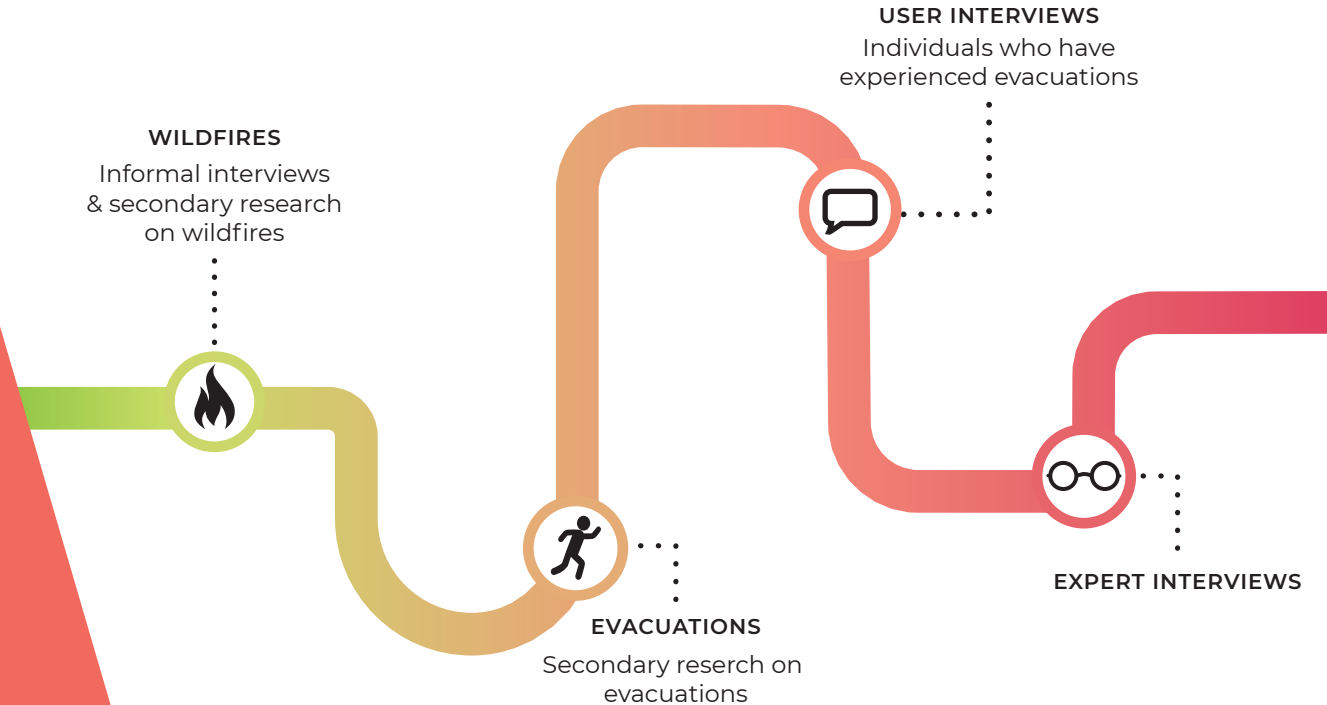
This devastation is not new to Greece as wildfires burn virtually every summer. Growing up in Athens and then returning to spend each summer at my grandfather's house in Kefalonia, I grew accustomed to the wildfires and smokey skies as well as the stories of devastation that came with it. While wildfires are increasing in intensity around the world I want to further understand how disasters affect entire communities, families, and also the psyche of disaster victims.



PROCESS

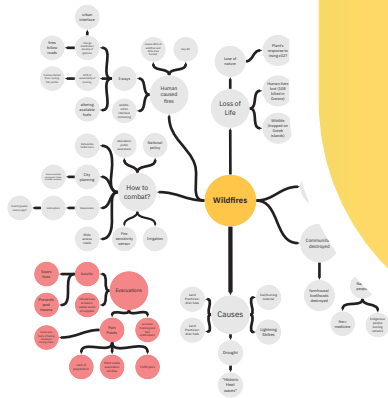


RESEARCH PLAN



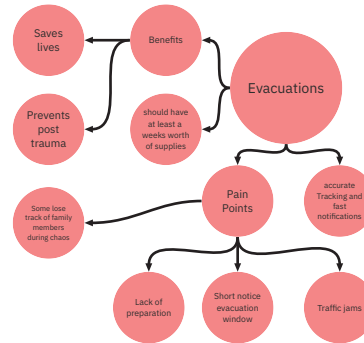


Communities affected
by Wildfires



WILDFIRE MINDMAPPING

Found opportunity in
evacuations



INFORMAL INTERVIEWS

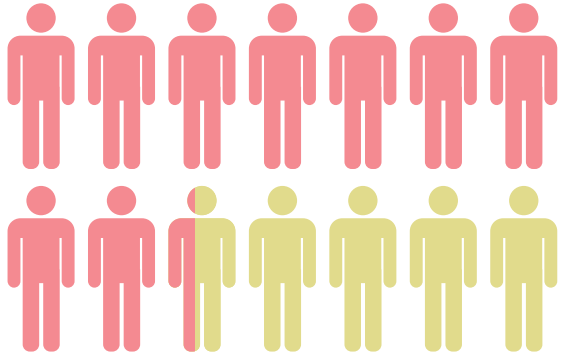
“The evacuation is the most stressful part because they give you almost no warning. One second the fire is on the other side of the mountain, then it’s coming down the hill to your house and you have 20 minutes to get your things and get out”

- CALIFORNIA RESIDENT

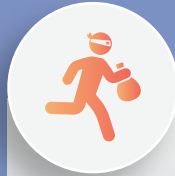
I reframed my opportunity statement to be geared towards evacuations for all natural disasters.

SECONDARY RESEARCH

“**Two-Thirds** of Hurricane Katrina victims died in their own homes from drowning or injury because they could not or would not evacuate”



FEAR OF
DAMAGE/LOOTING



43%

OVER-
CONFIDENCE



34%

PETS



34%

COSTS



32%

DISABILITY



14%

LACK OF
TRANSPORTATION



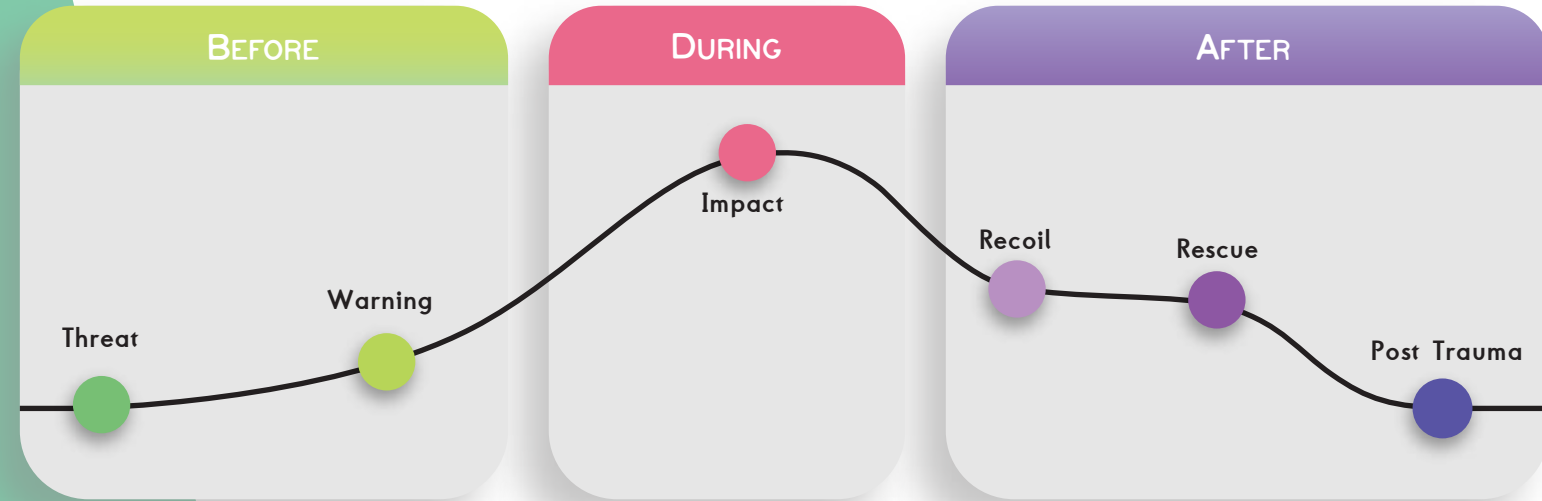
14%

WHY AMERICAN'S DON'T EVACUATE

- How do we encourage evacuations before or during natural disasters??
- How do we better help vulnerable individuals evacuate before or during natural disasters?

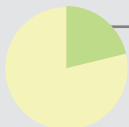
STAGES OF EVACUATION

Understanding human behavior and evacuation psychology for each phase of the natural disaster process, allows me to narrow-down to what stage I want to focus on for my design solution. Discovering user outlooks at each stage also helps me pinpoint specific problems.





THREAT



20% of the inhabitants refuse to evacuate

DEFINITION

Signs forecast a disaster. The fire is coming, but still distant.

OUTLOOKS

Threat identified but ignored
Perceived personal risk lower than actual risk
Unknown potential consequences of the disaster



WARNING

Most survivors are not able to evacuate independently at this stage

DEFINITION

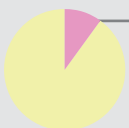
The disaster is imminent and known to the public.
ex. Fire is seen

OUTLOOKS

Denial of real threat of loss, injury and death
Ignoring or misperception of warning signals
Feelings of uncertainty



IMPACT



about 10% of survivors stay calm and alert

DEFINITION

Survivor is faced with disaster. Information processing is hampered and confused

OUTLOOKS

Sensory information too much to comprehend
Disbelief and denial of accidents and casualties
Stunned and bewildered feelings



RECOIL

people are aware of the damages of the impact but try to suppress realities

DEFINITION

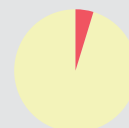
the direct cause of the threat has faded away or has ended. ex: The fire has stopped

OUTLOOKS

Confusion, denial of the actuality of the disaster
Slow realization of damages, casualties, injuries, losses
return of awareness



RESCUE



5% of bystanders will help victims of disasters

DEFINITION

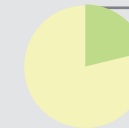
The survivors are more or less safe. Evacuation was successfully carried out

OUTLOOKS

Strong and irrational anger, anxiousness and feelings of guilt
Need to talk, need for comfort
Apathetic and exhausted behavior



POST TRAUMA



20% of survivors develop psychological disorders

DEFINITION

Survivors try to rebuild their life

OUTLOOKS

Development of PTSD
Vivid memories, dreams and nightmares about trauma
Developed phobia of things connected with trauma

DESIGN INCLUSIVELY

VULNERABLE INDIVIDUALS

Natural disasters have the potential to be life threatening, and in order to prevent loss of life or disaster trauma, I need to account for vulnerable individuals in society that are less likely to evacuate or more likely to develop PTSD from disaster experiences



CHILDREN

Research has shown that children experience severe reactions to stress following a natural disaster, including clinical needs and behavioral health issues such as PTSD



ELDERLY

70 % of Hurricane Katrina victims were elderly.
Many elderly individuals live in one story homes and have mobility issues and are more susceptible to drowning during floods.



INDIVIDUALS W/ LOW ECONOMIC STATUS

People in poverty, with low incomes, & with less education to be less prepared for disasters
preparedness actions = costly,
Many do not have flood or fire insurance



INDIVIDUALS W/ DISABILITIES

People with disabilities comprised 25 to 30 % of those impacted by Hurricanes Katrina and Rita
Transportation for evacuations rely on cars or public transportation. Limiting to individuals with disabilities.

KEY FINDINGS

COMMUNITY

Family members or neighbours insisting evacuation as well as seeing other people evacuating can trigger evacuation responses.

People stay with their friends and family where possible.

crowds of people cooperate with previous strangers during emergencies, even when faced with extreme personal danger

THREAT PERCEPTION

Individual past experiences influences threat perceptions

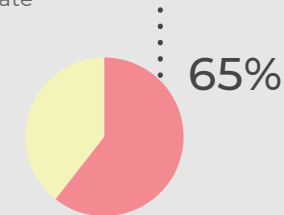


72.4% of the respondents in Okushiri anticipated a tsunami immediately after the earthquake because they had experienced the 1983 Japan Sea earthquake and tsunami.

Survey in Tohoku reported that 21.5% of respondents answered that they did not evacuate since they had not experienced a severe tsunami in the past.

PREPAREDNESS

Two-thirds of households (65 percent) documented in Columbia University's survey for Disaster Preparedness reported having no disaster plans or having plans that are not adequate



EVACUATION ROUTES

Evacuees are usually faced with extreme traffic, as there are too many people and not enough ways out.

The historic Camp Fire killed 85 people both in their homes, and in their cars. The fire cut off evacuation routes and gridlocked traffic



PRIMARY RESEARCH

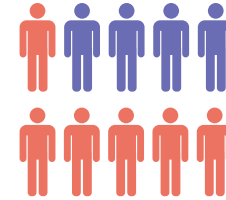
Overview & Goal

I conducted 10 total interviews from people who have experienced evacuations or had a close family member evacuate due to a natural disaster. My goal was to understand pain points in the evacuation process and to compare prepared and unprepared individuals.

9 USER INTERVIEWS

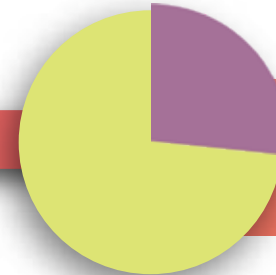


1 EXPERT INTERVIEW



10 Total Interviews

- 2 Mothers
- 2 Fathers
- 3 College Students
- 1 Child
- 2 Professional Women



4 Lost their homes or car from flooding or fire

6 Where caught unprepared for an evacuation

INTERVIEW QUESTIONS

Disaster knowledge

Disaster prep

Communication during evacuation

Step by step evacuation actions

Evacuation pain points

Disaster recovery



1 CHILD

KEY TAKEAWAYS

- 1 Received no disaster preparation
- 2 Disaster impact was unexpected. Had little to no time to gather belongings and leave
- 3 Has disaster fatigue, happens too often.
- 4 Evacuation pain points: happened too suddenly, lost sentimental items



3 UNPREPARED WOMEN

KEY TAKEAWAYS

- 1 Didn't believe evacuation was a possibility
- 2 Took too long to pack and leave, endangering themselves
- 3 Upset about time crunch
- 4 Evacuation pain points: happened too suddenly, lost sentimental items



2 MOTHERS

KEY TAKEAWAYS

- 1 Discusses evacuations to children, but doesn't give them a major role in evacuation prep
- 2 Are one of the first ones to leave after evacuation notice is given
- 3 Assists vulnerable family members and friends
- 4 Does not give into mass hysteria



2 FATHERS

KEY TAKAWAYS

- 1 Communicating with inner circle for each stage of evacuation process
- 2 Talks to neighbors about what to expect from disasters in area
- 3 Prepares property for disaster
- 4 Does not involve children with evacuation prep or educate them on safe practices



3 COLLEGE STUDENTS

KEY TAKAWAYS

- 1 Values location lifestyle over any natural disaster threat.
- 2 Doesn't believe disaster could hurt them or their property
- 3 Has disaster fatigue, happens too often.
- 4 Believes the issue will continue to increase for our generation

KEY EXPERT INTERVIEW



NICKOLE CHERON

Worked the last 16 years on emergency evacuations, preparedness and planning in the city of portland. She is also a voice for the disability community.

“With evacuations its very pragmatic, government relies on public transportation But transportation like buses only allow for 2 spaces for wheelchairs”

“We are a city with 62 acre about forest park that is central to downtown. If that were to catch fire, there would be a massive evacuation of downtown. We are not prepared”

“Sheltering is a huge pain point [...] they put someone in a shelter who had a wheelchair, and they could not use the showers because they were not equipped for those devices”

CONFUSION

“when Portland was threatened, most of the state was also on fire or in stages of evacuation. We didn’t figure out where to go. Because there was nowhere to go.”

UNPREPAREDNESS

“What should’ve taken 20 minutes took me 2 hours. Bc I didn’t have plan”

“People who use mobility devices, the majority of them do not have their own vehicles.”

“The Government does not have a plan for our disabled community”

COMMUNITY

“[the aftermath of the natural disaster] really brought the neighborhood together”

“People had to go in and get kids or dogs out, made sure cars were in garages”

“We have a lot of social circles. If we were more introverted, then we wouldn’t have friends checking up on us.”

KEY FINDINGS

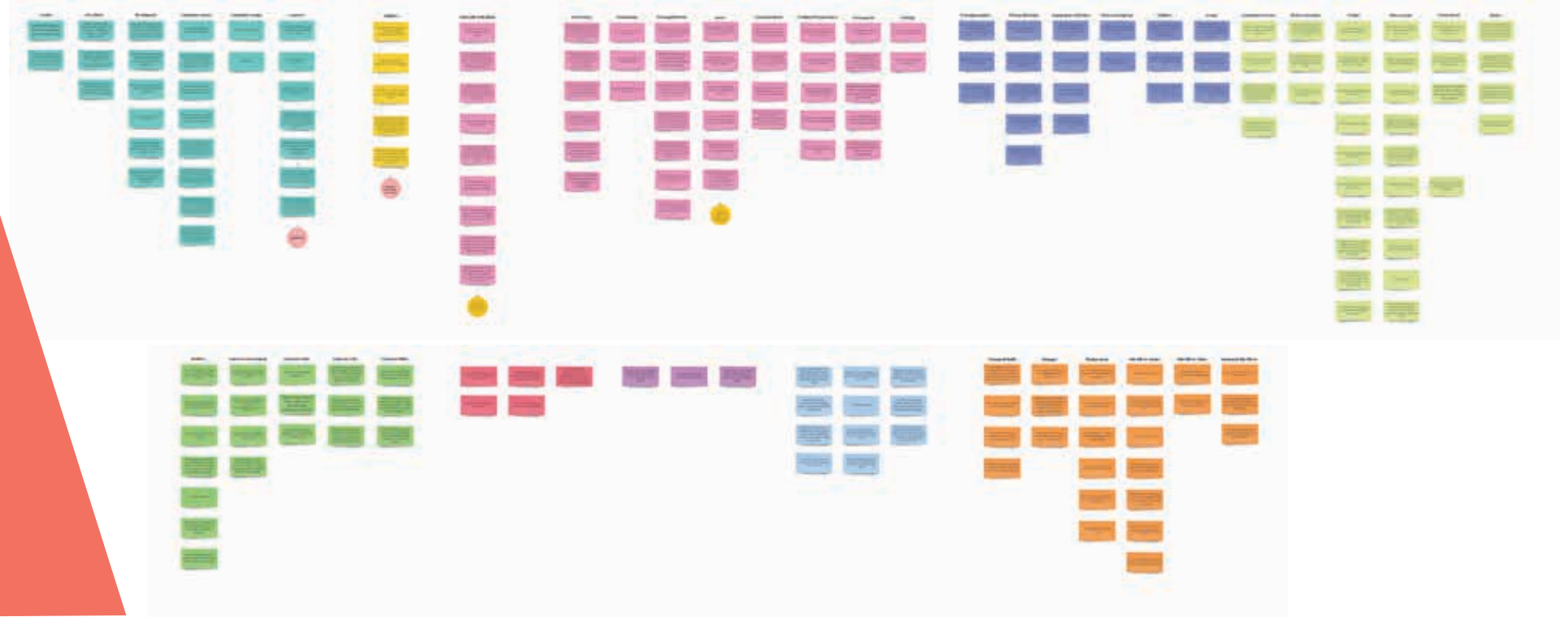


SYNTHESIS

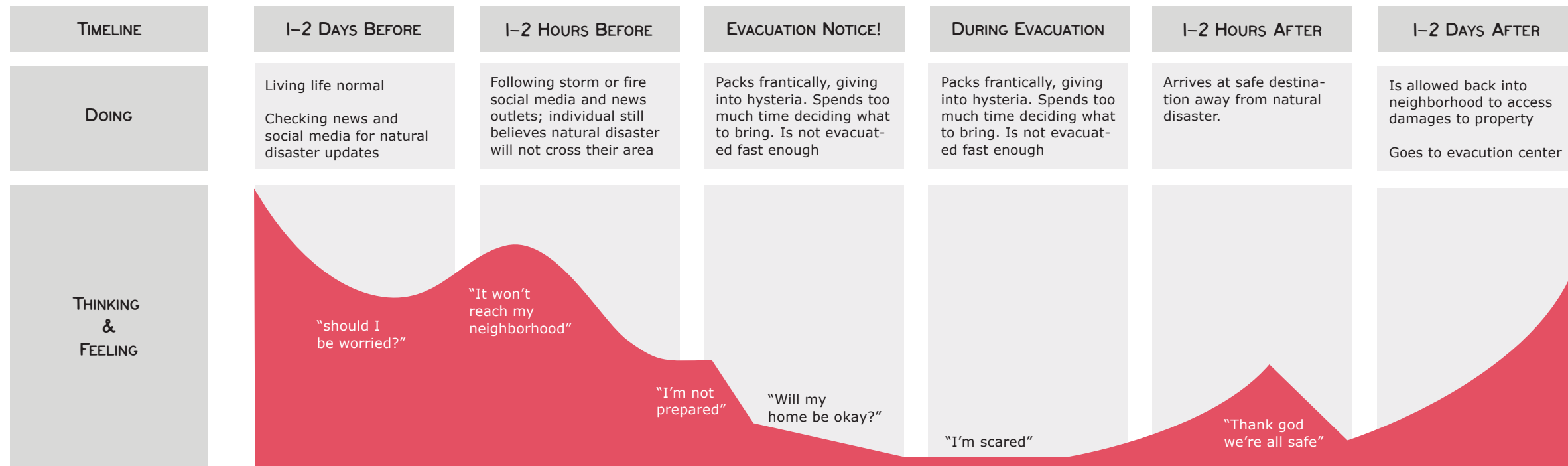
5 MAIN CATEGORIES

Community Involvement
Natural Disaster Preparation
Evacuation Process/ Concerns
Government Involvement
Disaster Recovery/Side Effects

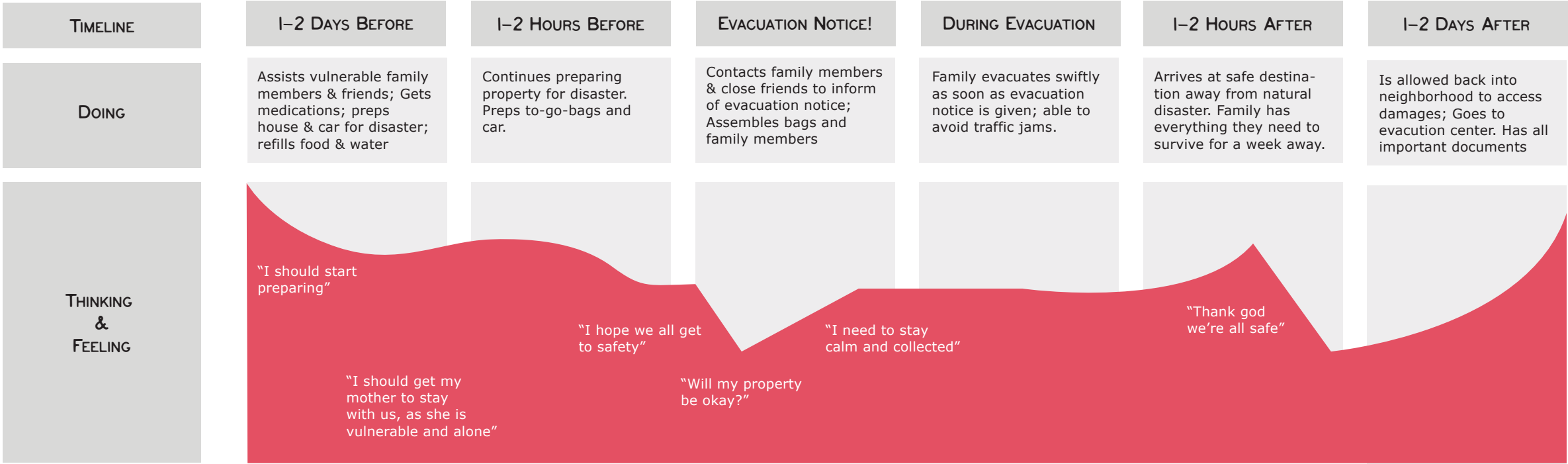
AFFINITY MAPPING



JOURNEY MAP OF AN UNPREPARED EVACUEE

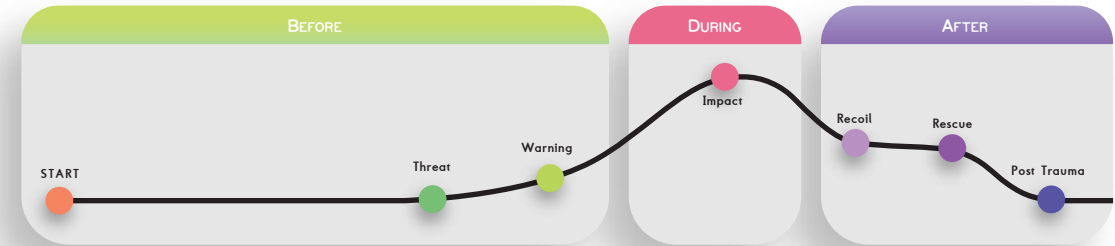
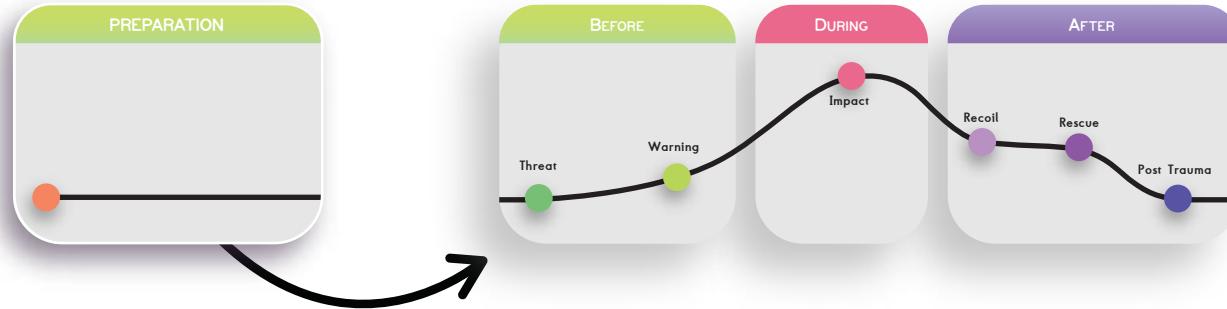


JOURNEY MAP OF A PREPARED EVACUEE



OPPORTUNITY

To design a product or an interactive system that helps individuals extend the evacuation process far before any known disaster threat. My goal is to promote preparedness and logical decision making before, during, and after an evacuation to minimize distress and mass hysteria.



HOW MIGHT WE

Educate and prepare children as to not frighten them during evacuation process

Connect our community during natural disasters to create an environment of assistance and inclusion.

How might we prioritize, educate, and assist vulnerable members of society during evacuations?

How might we expediate the packing and evacuation process?

USER NEEDS



Accessibility in all aspects of the design: Could include an interactive interface (or app) along with physical product



Clear evacuation plan to order to successfully clear danger zone



A way to communicate with inner circle during disaster or evacuation

DESIGN SHOULD

Be mindful of all types of disabilities, as getting every percentage of the population evacuated is a "human issue"

Educate users from different backgrounds or regions about disaster prep and regional environmental threats

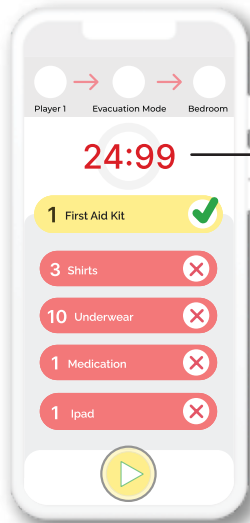
Promote calm and promote behavior and prevent frantic decision making during disaster

Promote organization for the user, in order to allow for a quick and easy departure.

Be mindful of power outages, that causes some family members to lose contact

Create a network of assistance for those in need of help.

APP PROTOTYPES

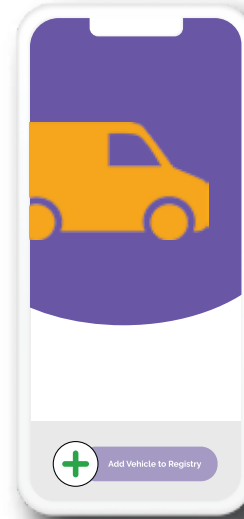


Timer helps user prepare for a quick evacuation notice. Can use app in "vacation mode" to practice, or evacuation mode for real life scenario

- Allows user to keep track of necessary evacuation gear



This app allows you to create a profile, and find evacuation housing outside of the danger zone. Similar to couch surfers, but for evacuations



Many individuals with disabilities do not own cars, or can not access public transportation. This app could allow individuals with proper vehicles to sign up and assist with any sudden evacuations.

NEXT STEPS

Throughout the discovery and define phase of my research process, I sought to narrow down my problem area and reframe my opportunity statement with a focus on evacuation preparation.

For next term I aim to conceptualize different solutions aligned with my user wants and needs, and validate my design decisions with user feedback and physical prototyping

APPENDIX.