
SURVIVE MODE

A design for better chances to survive in a natural disaster

Zhenxi Mi - December 18, 2015



Credit: [Hurricane Katrina Relief Operations](#), Capt Gregory Ball, USAFR, Ph.D.

Introduction

For thousands of thousands years, humans have been learning how to collaborate with nature, trying to modify the earth to a better habitat for us to live. Human lives are getting better every day as we can notice from ourselves. However, the nature has its own temper, when a burst of bad temper happens, humans become so weak and desperate. We can not control it, and we have no strength to beat it. With the assistance of modern science and technologies, we grow stronger, now we can predict disasters, and get better chances to **SURVIVE**.



CNS photo/Steve Nesius, Reuters

My solution is a mobile application called Survive, it works deeply collaboratively with the phone OS, creating better chances to survive by leveraging the existing technologies integrated on most of our mobile devices.

Before the disaster comes, it updates the latest information from the local emergency management office and alerts people if there is a potential disaster approaching. When an emergency scenario comes, this app will turn the phone into Survive Mode. With Survive Mode, the phones will only run with limited functionalities for lower power consumption. It sends a SOS message by Bluetooth LE Pulse at certain frequency to the rescue team and other survivors. Bluetooth 4.0 LE is also widely used for item locating, rescue team will be able to quickly find the survivors buried in debris by triangulating multiple devices.

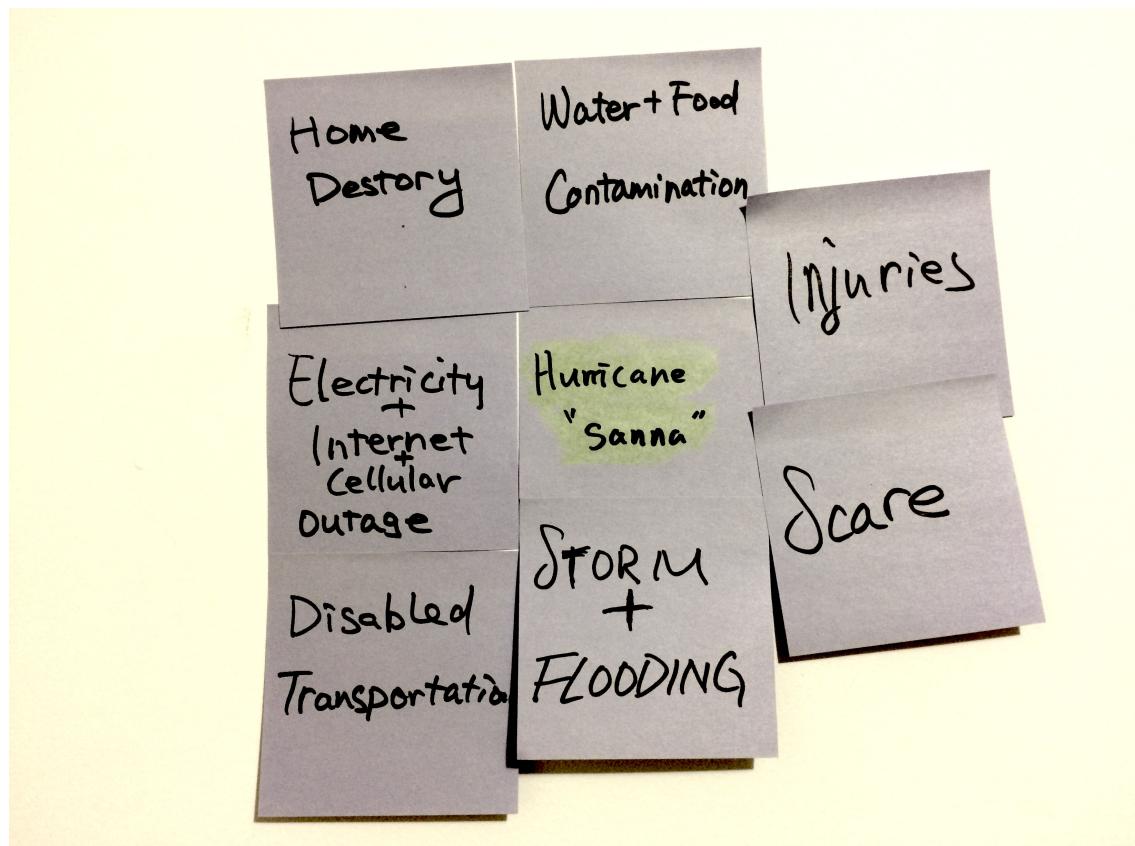
Hurricane Sanna

A cloudy Monday, it probably would rain for the first time in two years, Jacob was sitting in the cafeteria of his company next to a window having his lunch. His mobile phone beeped, an alert popped up said "hurricane warning" which meant that there was a hurricane possibly approaching to his location. He had never experienced this before, what should he do?

The scenario I choose to design against is a large-scale hurricane hits the San Francisco bay area in late summer. The forecast predicted this hurricane would land at the southwest coast and going south to Mexico, nobody expected it would hit directly on San Francisco because the sudden change of its route when it landed. The hurricane brought big storms and strong winds, all of these resulted in building damages and a massive flooding.

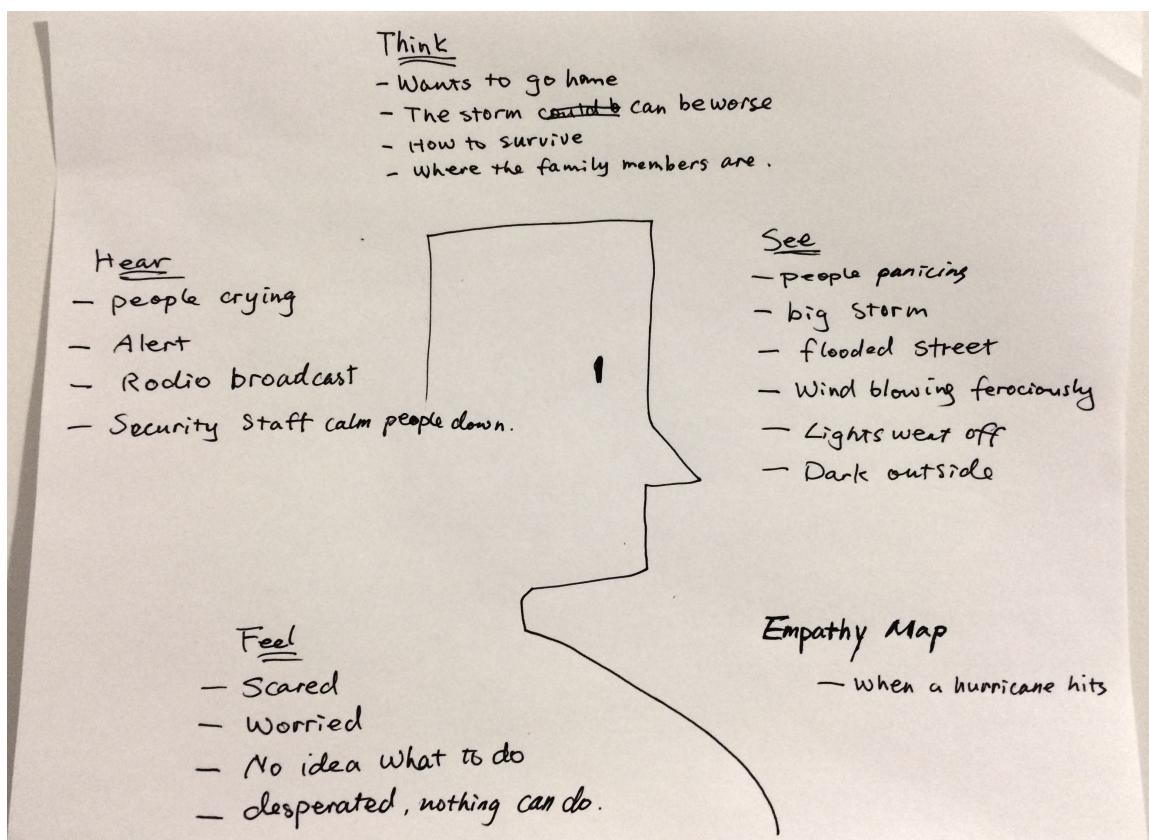
When Jacob was thinking about what to do, the weather turned from cloudy to very dark windy and misty, all of the sudden storms, lightening, and dusty wind came, it started pouring really really heavily. The sudden raining made the streets into rivers, it was not possible to go anywhere. Fear, panic, anxiety and coldness was filling in the air. Only half an hour later, the water burst into the building from windows, the water current and debris smashed the double layered glass windows. What should he do, how could he endure this massive natural disaster?

There is only one thing left in his mind, by instinct, to survive.

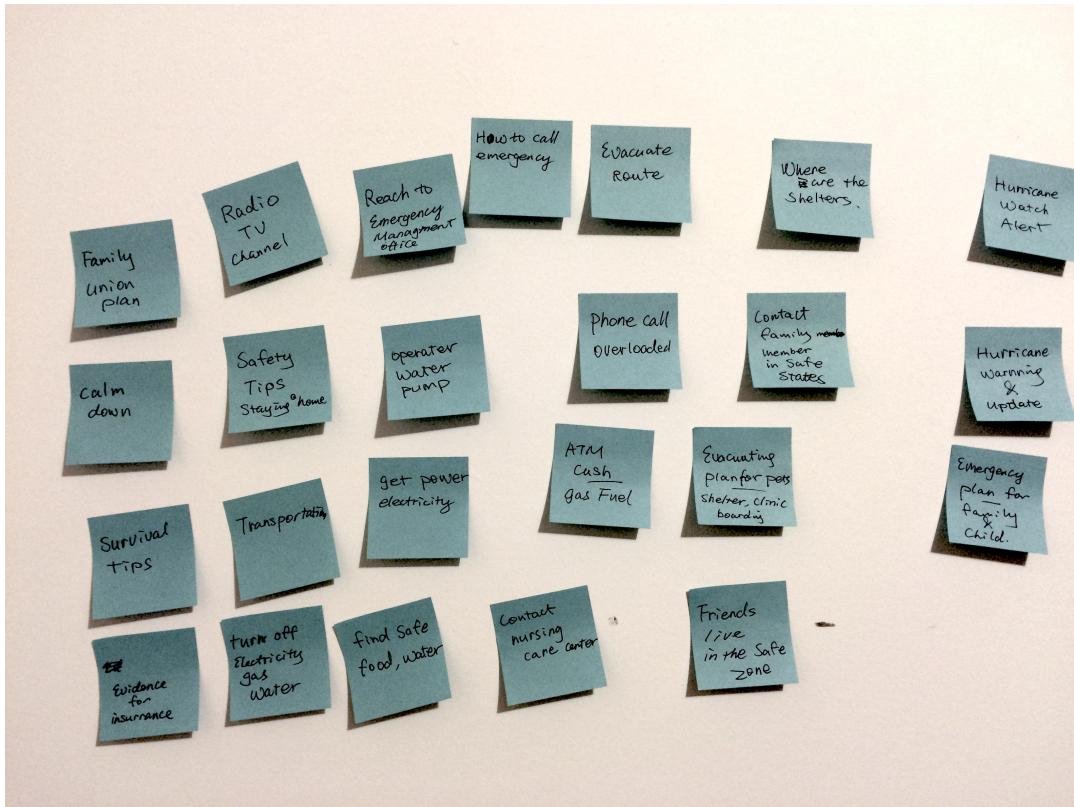


In order to put my mind into the scenarios, I conducted a very quick secondary research on the resources I can get from the internet. But if time and budget allows, primary research would bring more insights with higher quality, unfortunately I don't have . I read a couple of research articles about what the victims experienced during the natural disasters, and possible design opportunities.

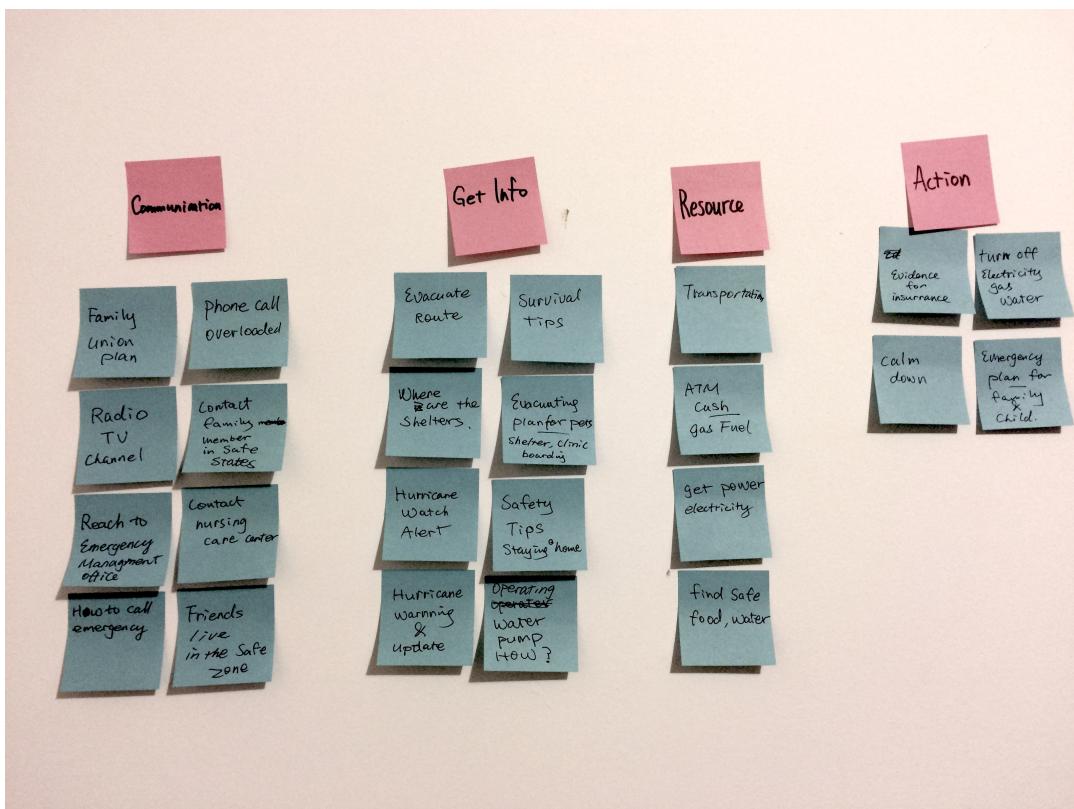
After gathering some data from the secondary research, I made an empathy map, trying to understand from different aspects about the situation of the victims at that moment. This will help me with starting to think about what they need and what kind of interaction can relieve their uncomfortableness.



The articles provide valuable sources to learn about what problems I am dealing with rather than the solutions that I can design upon. So my secondary research extended to some protocols provided by Federal Emergency Management Agency and Red Cross Chapter including how to prepare for natural disaster, tips to endure the disaster, as well as reminders for returning home after the disaster.



With these additional resource, I started to brainstorm on the possible needs of people in more details. Then I tried to arrange them by affinity diagramming technique. The needs fall into four categories:



COMMUNICATION:

- family union
- contact other family members, checking if they are safe
- contacting nursing care, kids boarding
- communication means other than overloaded phone call system
- radio channel or TV station
- reach to emergency management office
- how to call and what number to call for emergency
- contact friends in the safe zone for short staying

GETTING INFORMATION:

- evacuate route
- survival tips
- hostel & shelter locations
- pets shelters, boarding centers
- disaster alter, warning (before happening)
- disaster updates (after taking place)
- safety preparedness for staying at home
- how to use water pump (drain flooding water)

SEEKING RESOURCE:

- transportation
- ATM, fuel
- safe food, water
- power, electricity
- [new] medication for injuries and chronic disease

ACTIONS PEOPLE MAY TAKE:

- collect evidence for insurance concern
- turn off electricity, gas, and water
- calm down
- emergency plan for children and seniors
- [new] video log or diary

My design is focusing on solving the problems that victims encountered with primarily, in this case, some secondary points were filtered out in the list above:

- trade without cash
- manage volunteer
- distribution of rescue resource

Besides the needs, there are some general constraints should be considered when designing the user experience:



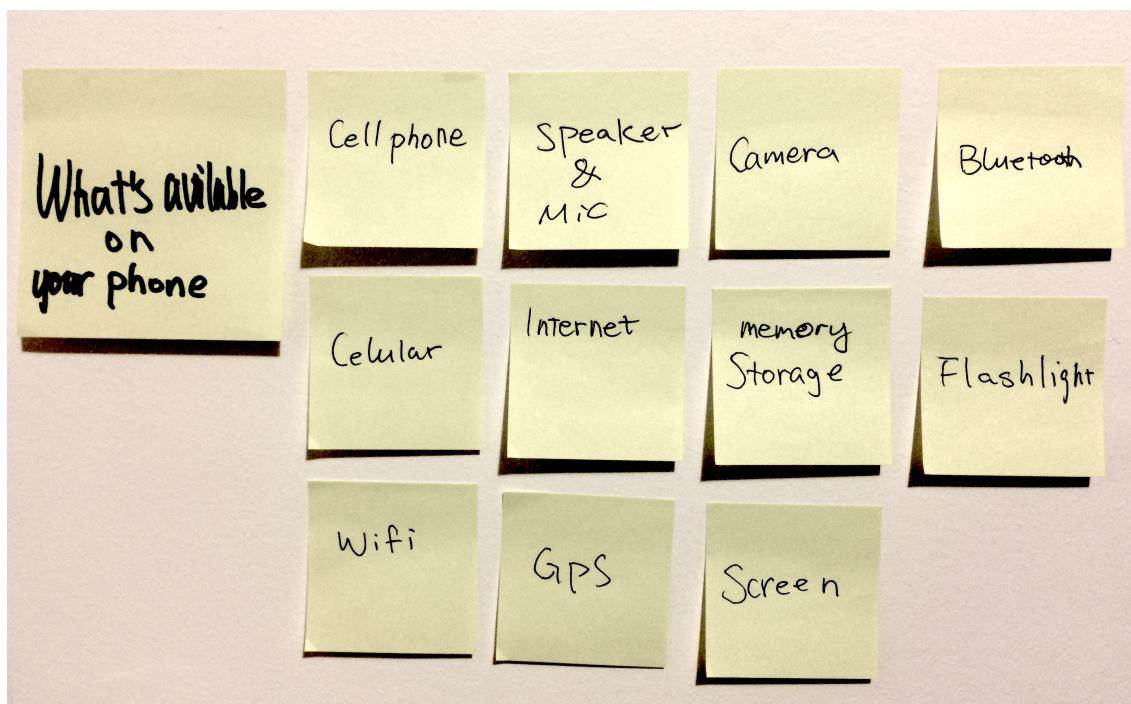
- security for food, water, sub-sequential accidents, injuries, sickness and other health conditions.
- accessibility for disabled survivors, for instance, motor, vision, hearing impairment, language barrier, injuries, mental sickness.
- trapped in a closed space

- **limited knowledge, information, communication**
- continuous medication or treatment for chronic disease
- **limited batter life**
- Internet / cellular outage or overloaded traffic
- resource shortage
- **lost in directions**
- landscape disadvantages
- **unstable mental state**
- **temperature/keep warm, away from hypothermia**
- wild animals

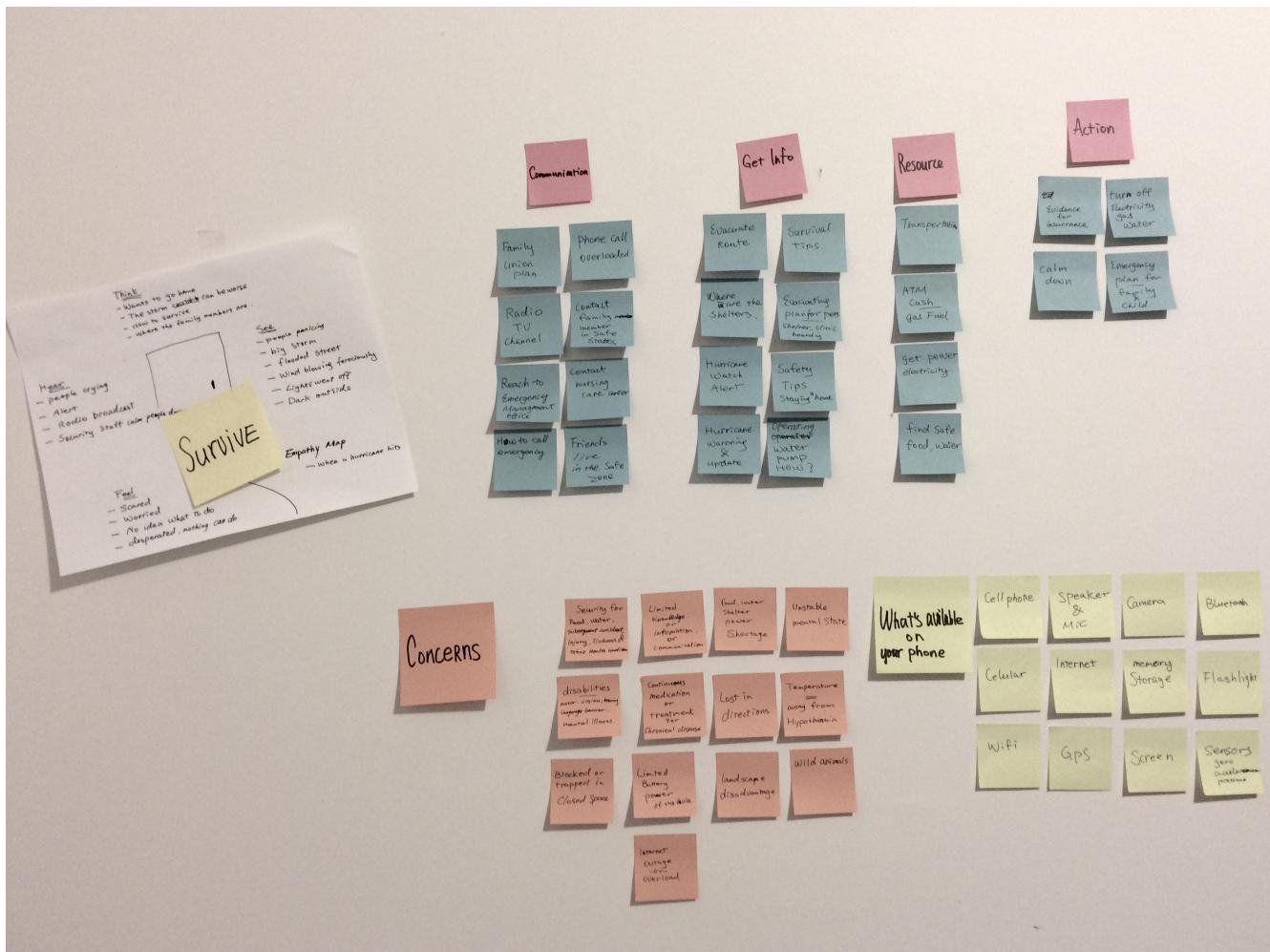
*bolded items are the considerations I took in my design later on.

After these analysis, I decided to design for mobile application. There are four main reasons, firstly and mostly importantly, mobile phones have much higher possession rate than personal computers(laptop, desktop). Secondly, mobile phones are powered by batteries, highly compact and portable. Thirdly, there are much more rich sensors integrated in mobile phone. Last but not least, the devices will run most likely off-line, which means no accessibility to web server.

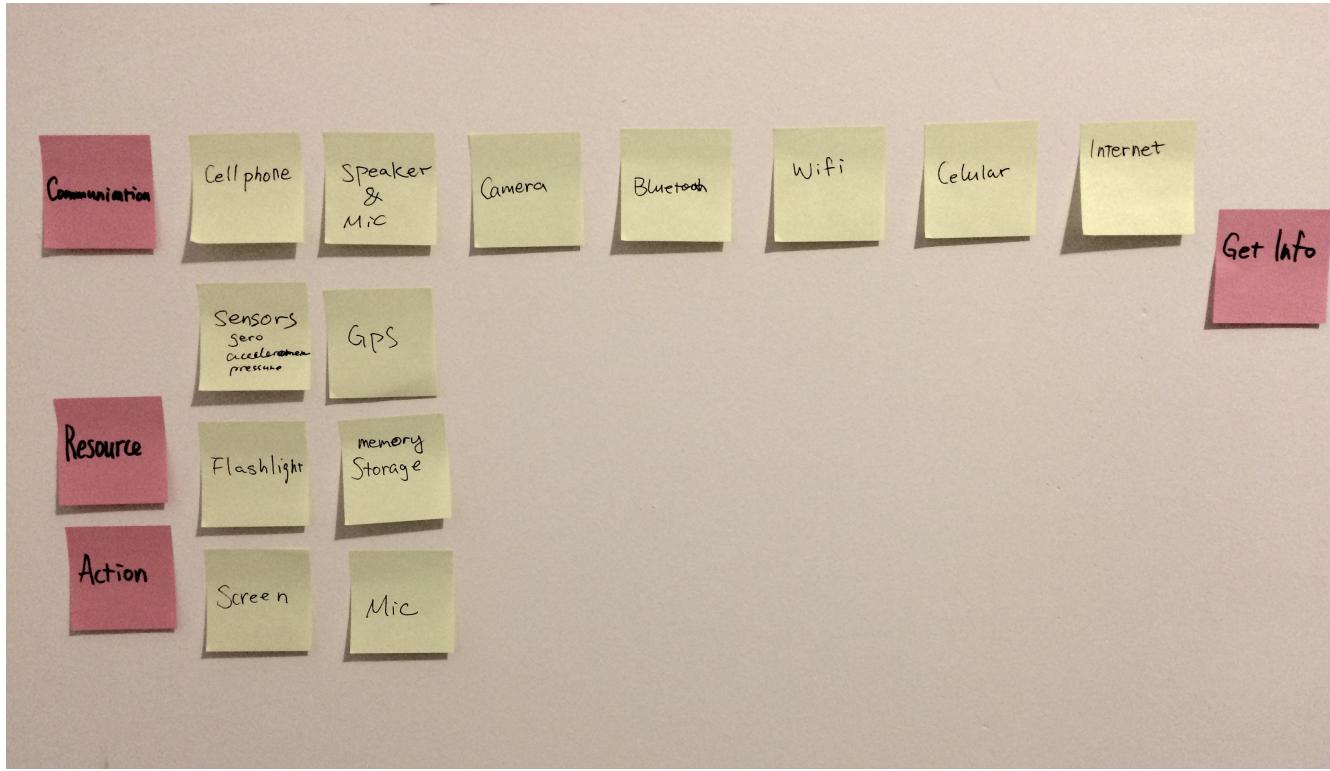
Thus, I started to look at what are available on a mobile device:



The findings above are pointing to an ultimate goal of every survivor—To Survive. I start to think about how to improve the chances for survival. My secondary research shows time matters, the earlier the rescue team find the survivors, the higher chance they can survive. And certain emergence knowledge can ensure people holding on till the rescue team find them.

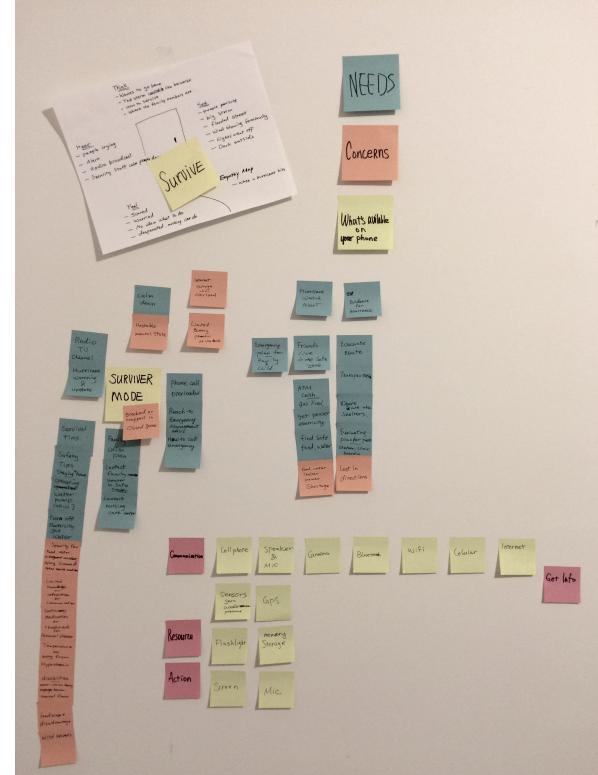


I reorganized the phone features with the categories I got from the need finding process. The design directions converged from former divergence. The technologies we have on our mobile phone can assist achieving the needs I found out earlier.



Then I came out with the concept of Survive Mode, which leverages the technologies provided by our mobile devices to improve the chances of survival through increasing the speed of getting rescued and keeping a good shape before rescued.

I drew the probable functionalities and constraints related to Survive Mode together. I got a very clear idea of what I am going to design.



SURVIVE MODE

Survive Mode can turn our mobile phones into a low power consumption working state with limited but essential functionalities for emergency situations, for instance, enduring a natural disaster.

Hypothesis:

Ensuring security and rescue search efficiency can result better chances to survive.

The main feature includes:

- disaster information updates (prediction and progress)

WHY: Knowing predictions will give more time for better preparedness, access to the latest update of the disaster progress can help survivors make decisions.

- personal information storage (identity, contact, medical info)

WHY: personal information is crucial for rescue, for example contacting survivor's relatives, and rescue team need personal information to making decisions, especially for taking medical procedures, like blood type, medical history.

- manual for necessary knowledge (first aid, radio channel, preparedness, safety tips)

WHY: many people don't have any experience of dealing the situations they encountered during the disaster.

- Bluetooth pulse SOS message

WHY: constantly sending a message will eventually drain the battery, attempt to send at a frequency may help the battery last longer. The message can be receive by any available SURVIVE MODE activated devices, and it relays topologically to every end client. It improves the probability of reaching to the rescue team without cellular network.

- share status

WHY: works similarly to pulse SOS message, survivors can share information such as requesting for help or offering help.

- locating survivor by Bluetooth LE

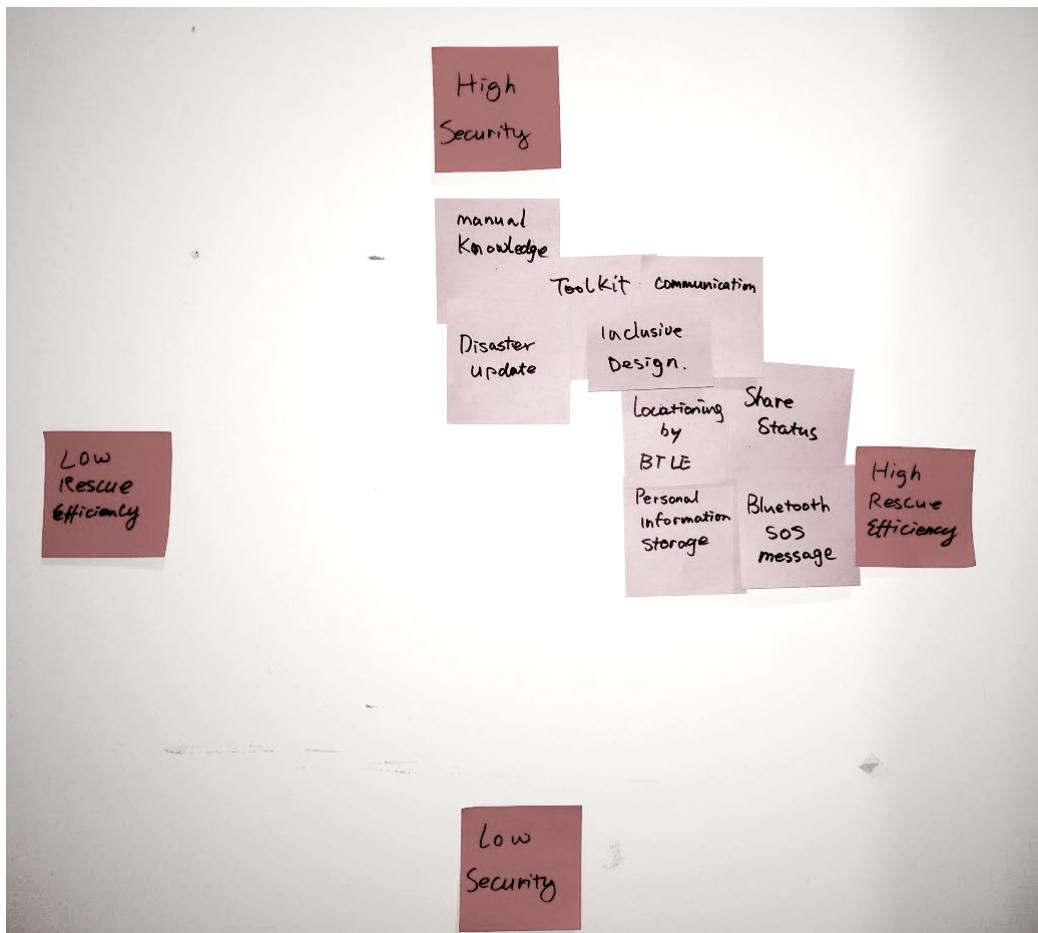
WHY: indoor search and navigation is a big challenge for rescue team, there are many solutions, iBeacon is one of them. Bluetooth LE technologies is current and has been used widely for tracking items. Most importantly, it doesn't require any professional device to carry out the search.

- communication with rescue team and other survivors
- toolkit for survival(compass, flashlight, camera, note taking, time, timer, sound to keep calm)

WHY: there are many utility tools available on our mobile phones, they are very handy in enduring disaster situations. For instance, camera can make video logs, note taking can keep track of a diary, timer may be used for preventing survivors from hypothermia by waking them up after a short sleep.

- inclusive design with big button and screen reader

WHY: people may get all kinds of injuries, increasing accessibility is necessary. And also the phone may be used by non-original user.





Survive Mode improves rescue efficiency by providing location and communication

Storyboard:

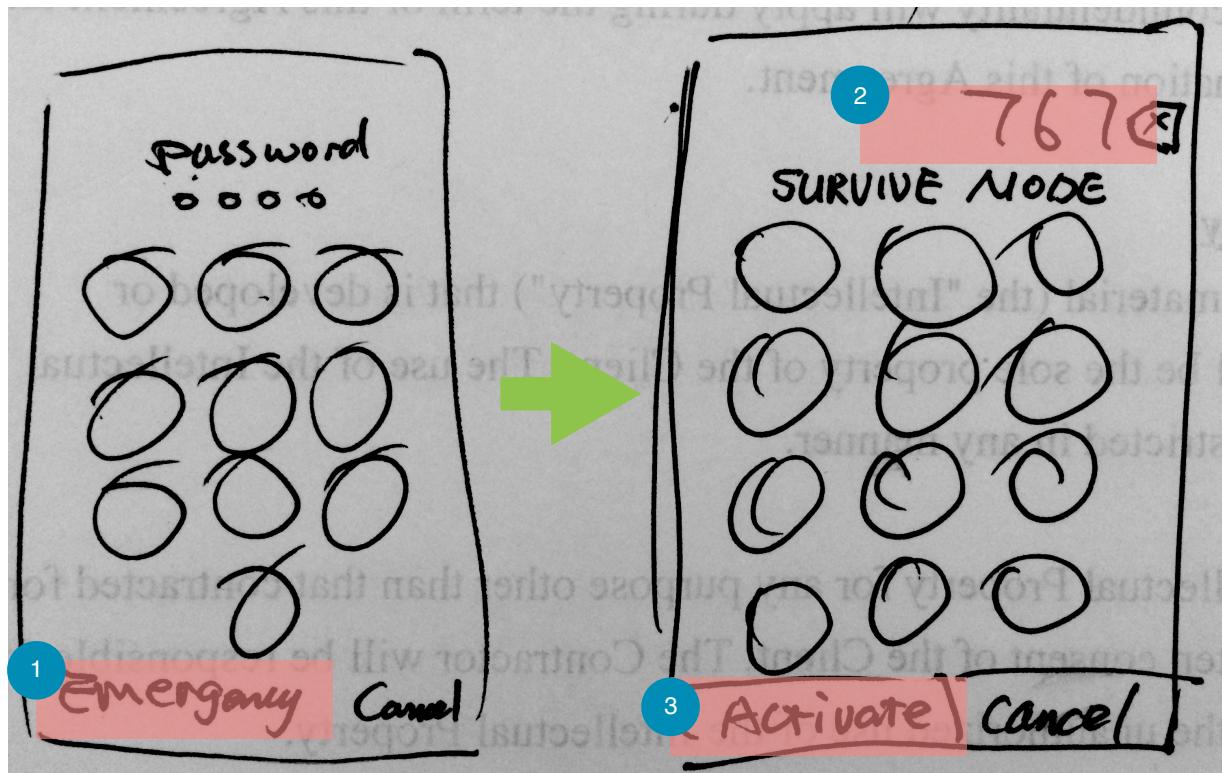
- (1) Jacob is trapped in his office, the door is blocked and his leg is injured. He is very desperate.
- (2) Jacob turned on SURVIVE MODE.
- (3) He has nothing to treat his leg, he is suffering. Jacob's phone is automatically sending the location information to all devices in 100m range.
- (4) He composes a message in SURVIVE MODE, sharing his status.
- (5) Rescue team successfully locates Jacob's position, and gets his status information. A team is preparing for the rescue with appropriate medical care.
- (6) Jacob is rescued, the helicopter will send him to a safe zone for further treatment.

Sketch:

There are two ways to activate the Survive Mode:

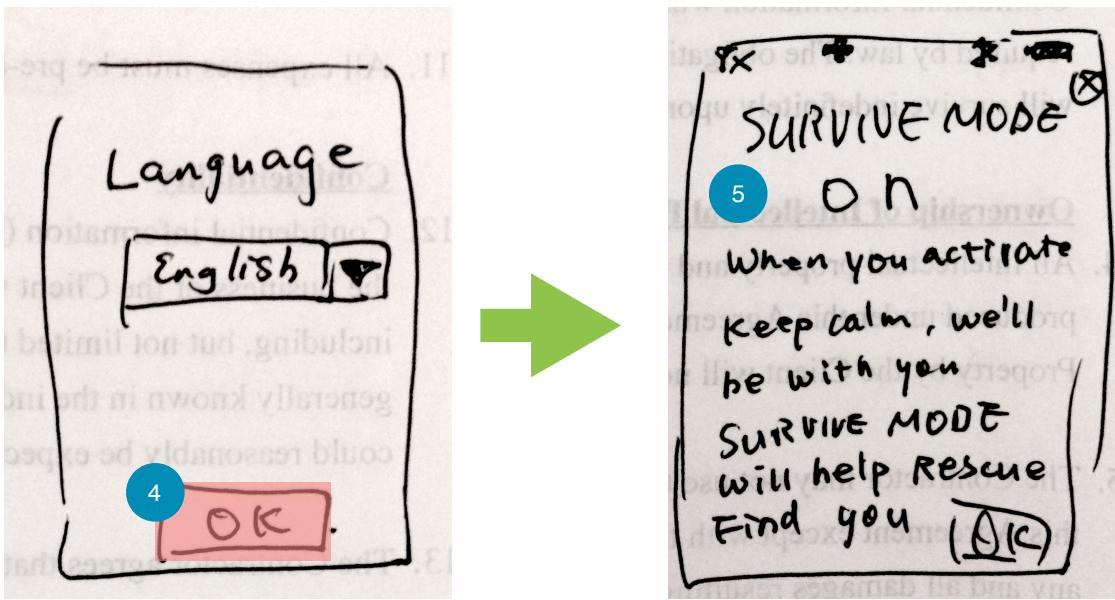
First, when the cellar network is available, the providers can activate it through network commands, similar to Amber Alert.

Second, it can be activated manually at emergency calling interface.

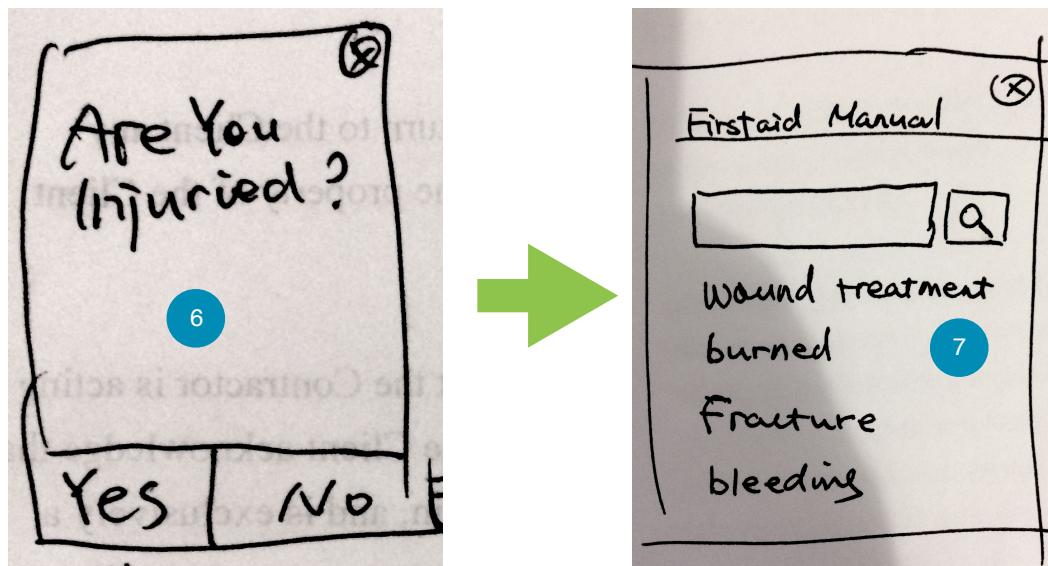


- 1 go to emergency calling mode.
- 2 dial 767 which stands for SOS according to the keypad.
- 3 hit activate





- 4 Confirm language in case if the people is not the original user.
- 5 A short introduction of what survive mode does.

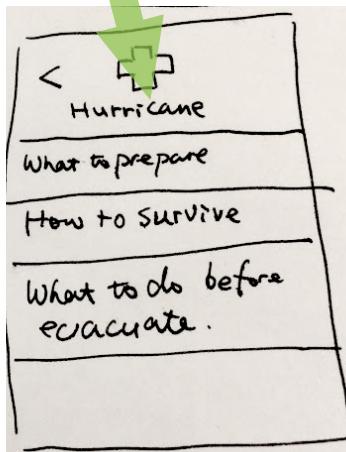
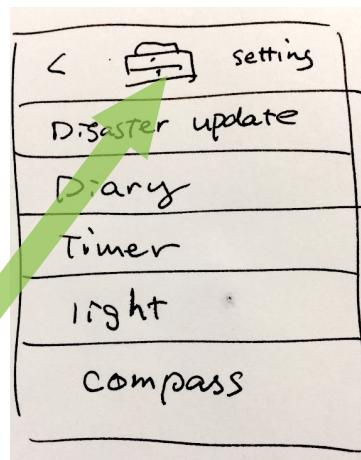
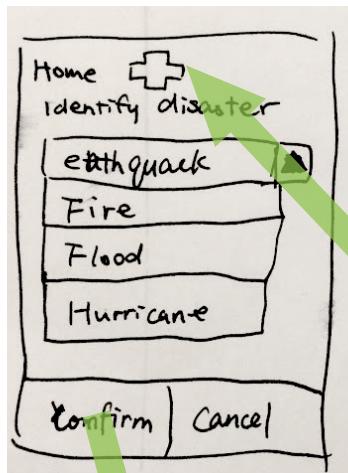
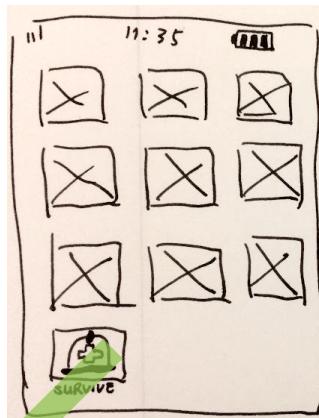


- 6 If the user is injured, the first priority is getting appropriate treatment, by answering yes, it will take the user to the first aid manual.
- 7 User can choose either search or click on the short-cuts for most common situations below the search box

Wireframe of Survive Mode



Wireframe of Survive App



Research Plan:

I will firstly take a quick survey either online or on the street because survey can collect quantitative data very quickly with a relatively larger segment of the target audience. It's a low budget research method in terms of time and money cost. I can be conducted while recruiting participants for interviews later, this usually will take at least two weeks with screening and scheduling. With the data collected from the survey, I may gain more new insights that raise questions for further exploration in the interview session, or maybe I will be able to validate some of my assumptions. In addition the survey would help me to decide some of the screening criteria for interview participants, for instance, I am not sure about what demographic of people I should recruit, for example it seems the young generation may not be fit since they don't have a lot of experience.

Then I will conduct a semi-constructed interview session with 5-8 participants who have experienced natural disaster situations as survivor, rescue, volunteer, friends or family of a survivor, and some one who has no experience of encountering natural disaster. But here we have to make sure they are comfortable to talk about their experience about the disaster. We definitely wouldn't like to recall their disaster trauma. The preferred location is where the disaster happened, the contextual environment can help them remember the details.

The interview questions will be open-ended. For example:

- Have you ever been in a dangerous situation?
- Have you experienced any natural disaster? If yes, what happened? What did you see, hear, feel, think and say?
 - What was your first reaction?
 - What would be helpful if you had it already, it can be a tool, a knowledge, or feeling, or anything you can think of?
 - How did the rescue team find you?
 - What was the most important thing you had, and why?
 - What made you feel bad, why?
 - Did you have a mobile phone, did it work? How?

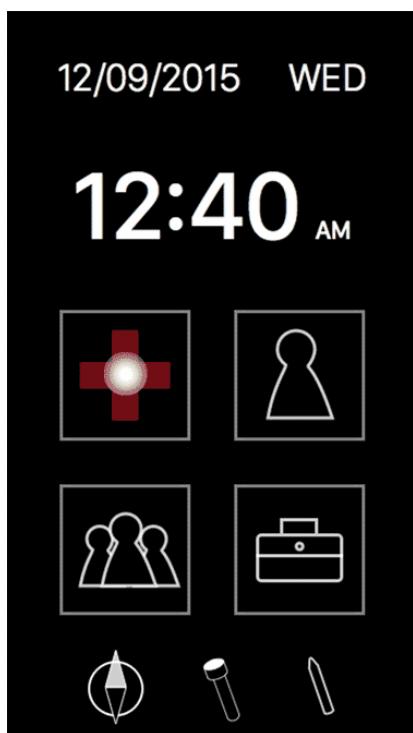
Usability testing:

I would like to recruit 20 participants for the usability testing. I will give everyone a similar scenario where this application can be used, and I will have different sets of tasks for them to accomplish by using this application. They will be asked to think out-aloud, but

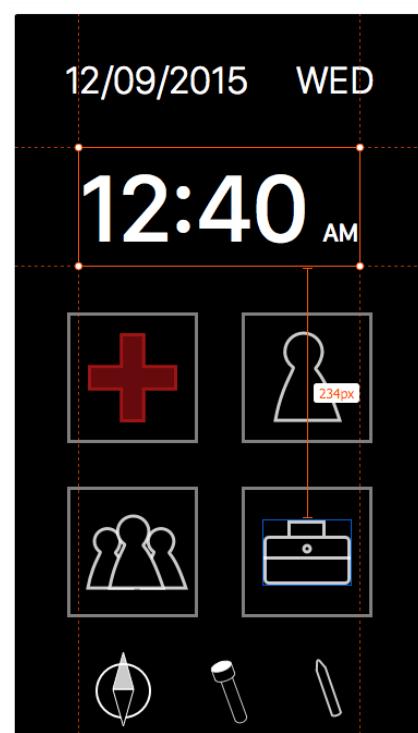
usually the participants are not used to do this. In this case, I will ask questions to guide them thinking out-aloud, as well as avoid bias. For instance:

- What are you looking at?
- What did you see?
- What do you think it means?
- What do you think it can do?
- Why you hesitated?
- When you paused what is in your mind?
- What did you use it for?
- What is not clear to you?
- How do you think it should be?

Other samples:



prototype sample



specs sample