

# **SENIOR CAPSTONE PROCESS BOOKLET**

**KATIE BUSH**

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I extend my thanks to Battelle for their encouragement and support throughout this capstone process.

Furthermore, I want to extend my appreciation to my professors, Sébastien Proulx and Will Nickley, for the invaluable guidance and support they have generously provided throughout my tenure in the design program.



## INTRODUCTION

In a world shrouded with uncertainty, the presence of potential mass casualty incidents (MCIs) serves as a stark reminder that unforeseen events can occur at any time.

Despite the unpredictability of what lies ahead, it is imperative that we proactively ready ourselves for emergency scenarios.

Within this endeavor, we delve into innovative initiatives aimed at enhancing public-facing emergency preparedness. The goal is to inspire businesses and organizations to go beyond the basics in anticipation of potential MCIs.

This book unfolds the essence of its thesis, encapsulating the concepts, thoughts, and design processes involved in the development of new public-facing emergency preparation initiatives. It serves as a demonstration not only of theoretical frameworks but also the tangible products that result from these endeavors.

## TABLE OF CONTENTS

### THE BRIEF

4 ABOUT BATTELLE

5 BACKGROUND INFORMATION

6 DESIGN OBJECTIVES

7 WEEKLY TIMELINE

### RESEARCH

8 INTRODUCTION : EXPLORING THE BRIEF

12 PRIMARY RESEARCH PLAN

14 SURVEY DESIGN

17 INTERVIEWS WITH INDUSTRY EXPERTS

19 PROBLEMATIZATION: DDX METHODOLOGY

31 REFINING THE PROBLEMATIC

### EXPLORATION

32 DESIGN CONJECTURES

41 FORMATIVE ASSESSMENT

44 PROJECT DEVELOPMENT

### FINAL WORK

48 SCENARIO OF USE

50 FORM REFINEMENT

55 APPEARANCE MODEL

56 CONCEPT INTRODUCTION



## ABOUT **BATTELLE**

Established by Gordon Battelle in 1929, this private nonprofit organization is dedicated to converting scientific discoveries and technological advancements into societal advantages. As an international science and technology enterprise, it delves into emerging scientific domains, advances technology, and oversees laboratories on behalf of clients.

The roots of the organization's vision and mission can be traced back to the legacy of Gordon Battelle, a visionary steel industrialist. His 1923 Last Will & Testament articulates the core principles:

**“Translate scientific discovery and technology advances into societal benefits. . . for the purpose of education in connection with and the encouragement of creative and research work in the making of discoveries and inventions . . . to do the greatest good for humanity . . .”**

## BACKGROUND **INFORMATION**

The Ohio State University Capstone Design Showcase is a culmination of senior undergraduate capstone design projects from the Industrial Design discipline. Over a 14 week period beginning in August, 2023, students work alongside sponsoring companies and industry professionals to develop a concept which addresses the given brief of the respective companies. The process is divided into two, 7 week portions: Research and Implementation. Individual students present their projects and selected findings to a team of judges comprised of industry and faculty.



DESIGN OBJECTIVES

Thinking of a mass casualty incident (MCI) or a rescue event, how could any capable person safely and adequately transport an injured person to receive care?

The realities of on-field medical care are, by nature, extremely complex to capture. Given the changing context of interventions, the type of injury encountered, the distance to the hospital, the means of transportation, or lack thereof, the expertise and knowledge of "medics" are variegated. Designers here have an interesting role to play in seizing new opportunities to support and improve experiences and practices. More specifically, the issue of patient transportation as it is turned toward the injured by providing healthcare or supporting the medics themselves, many problems are yet to be solved. New products and services can be envisioned to transform and innovate on-field practice today.

WEEKLY TIMELINE

- 1 ————— INTRODUCTION
- 2 — BACKGROUND RESEARCH
- 3 — PRIMARY RESEARCH PLAN
- 4 ————— SURVEY DESIGN
- 5 ——— PROBLEM DIAGNOSIS
- 6 ——— DESIGN CONJECTURES
- 7 — **RESEARCH PRESENTATION**

- FORMATIVE ASSESSMENT ——— 8
- PROJECT DEVELOPMENT ——— 9
- SCENARIO OF USE ——— 10
- MID-TERM REVIEW** ——— 11
- FORM REFINEMENT ——— 12
- APPEARANCE MODEL ——— 13
- PRODUCT VIDEO ——— 14
- CAPSTONE SHOWCASE** ——— 15

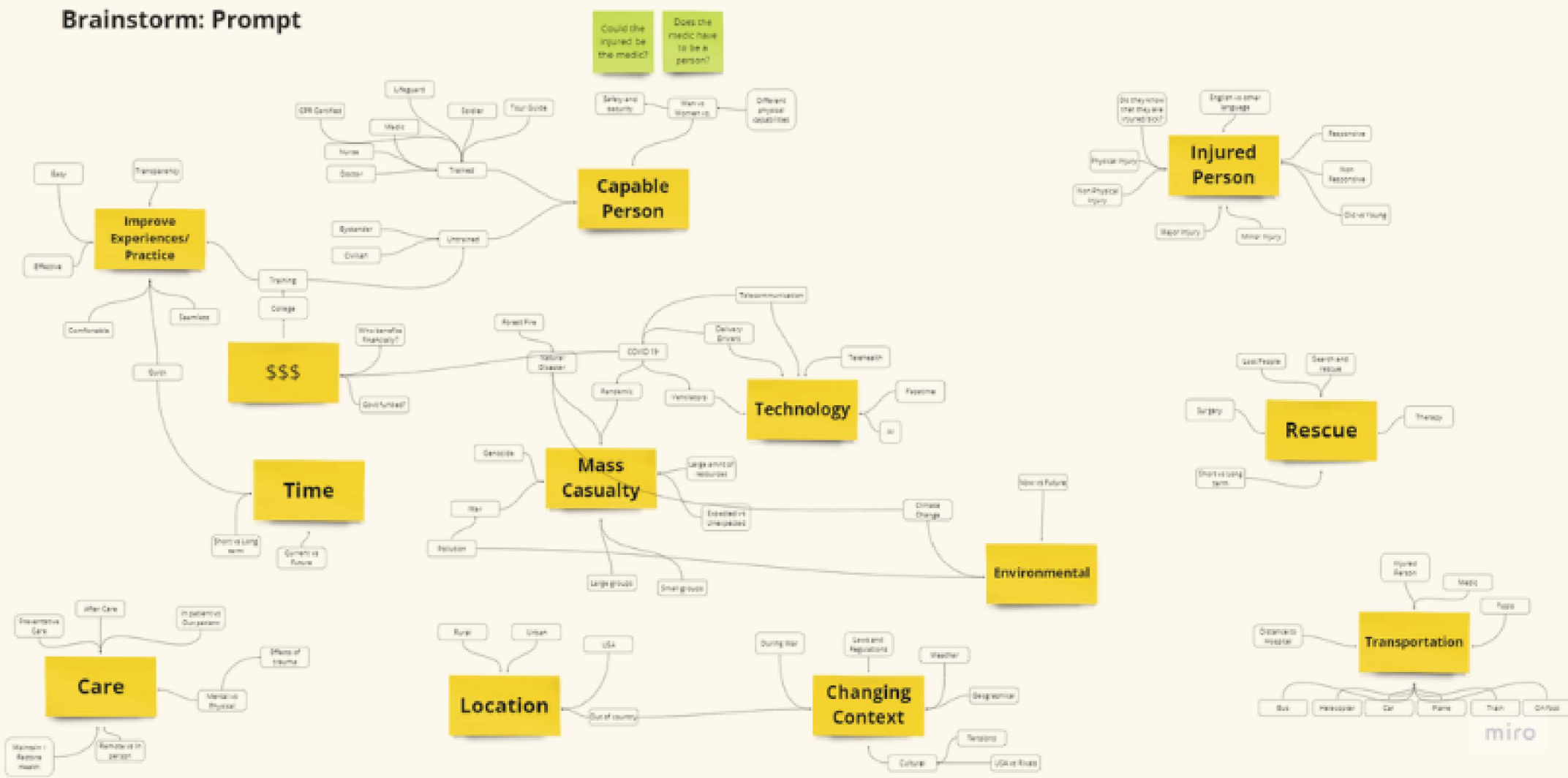


# INTRODUCTION: EXPLORING THE BRIEF

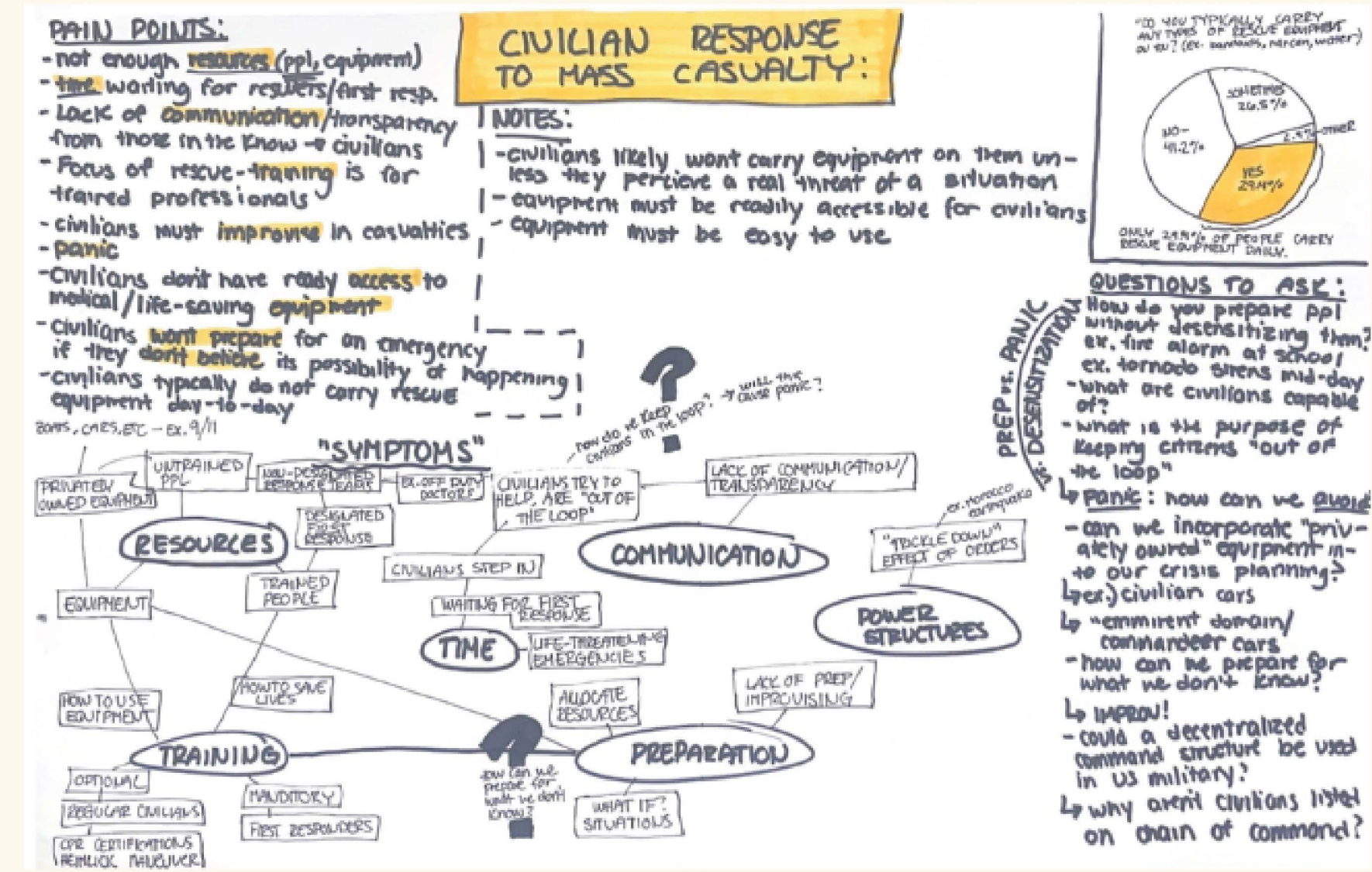
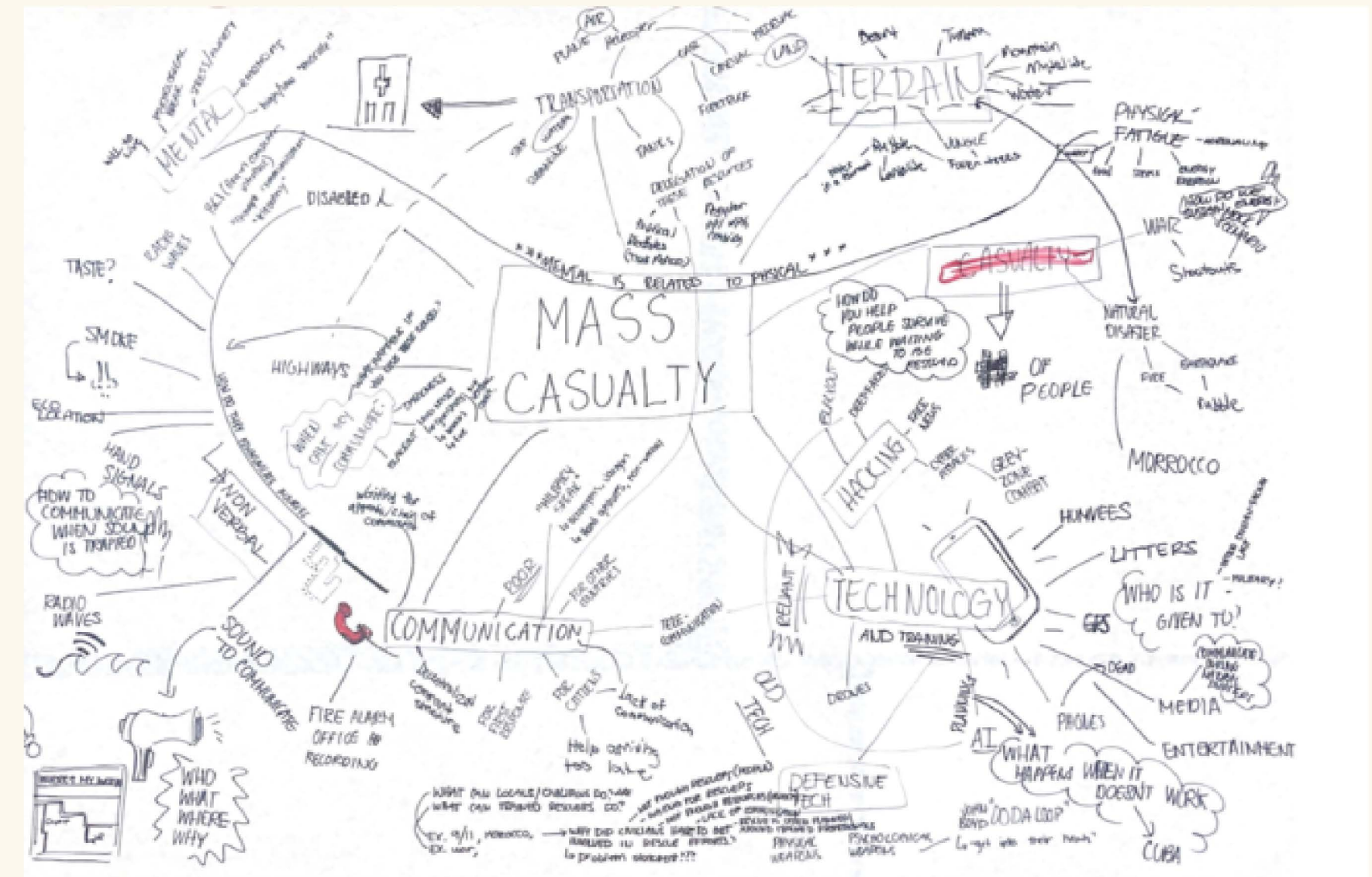
RESEARCH

RESEARCH

## Brainstorm: Prompt

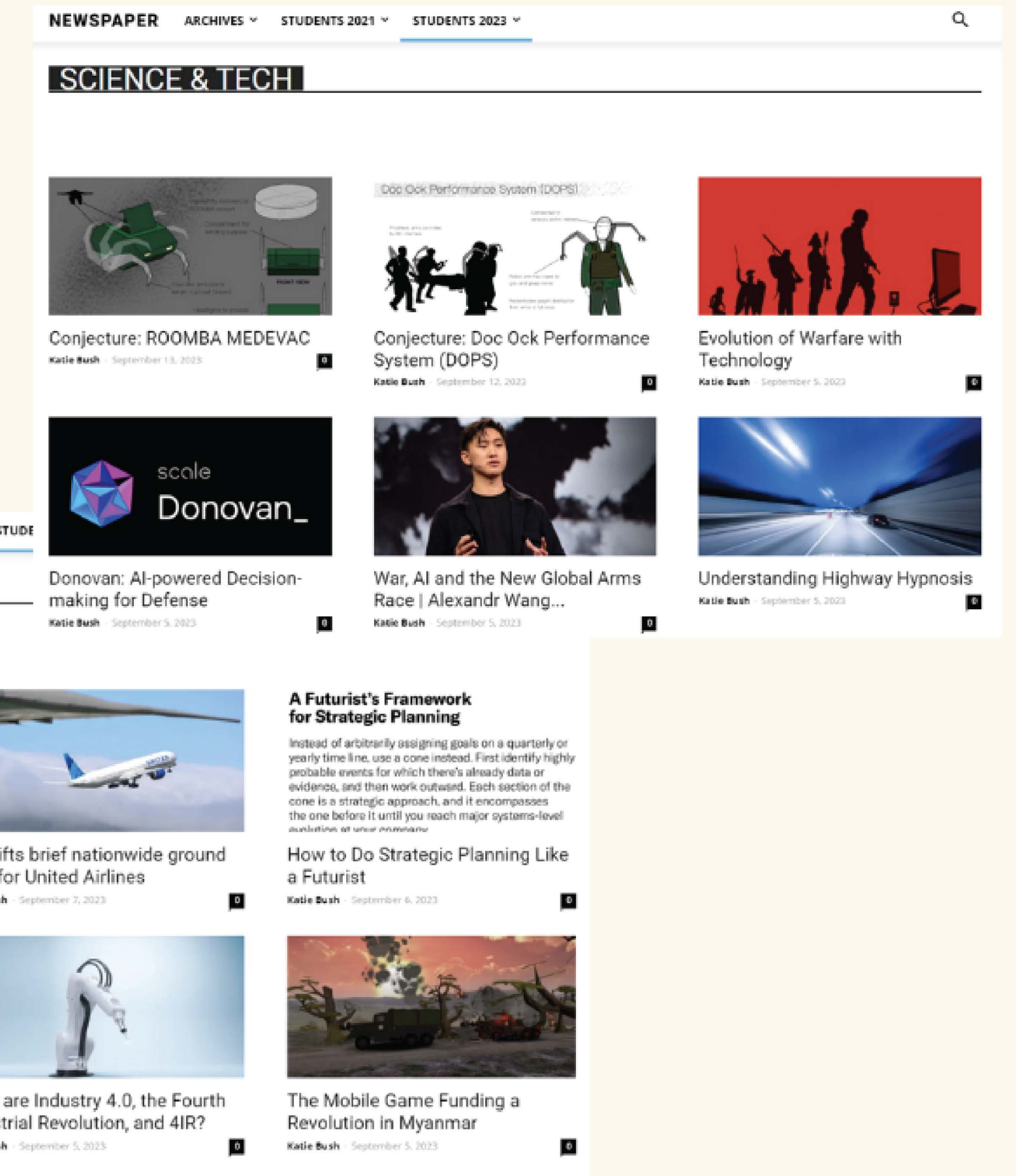
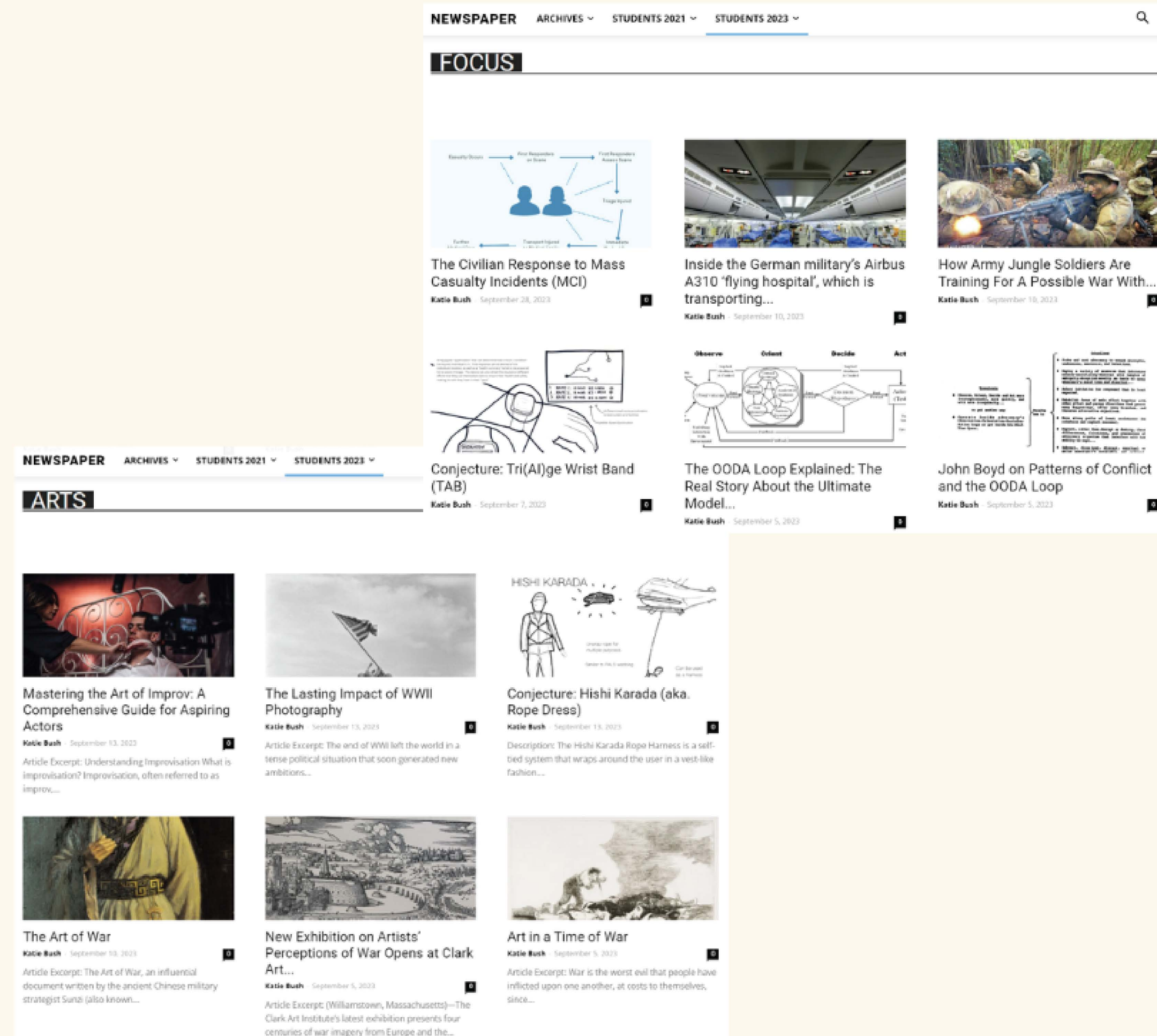


## Brainstorm: Jungle Warfare





Background research took the form of a "Research Dossier," divided into four thematic sections: **Focus, Arts, Business, and Science & Technology.**



As background research was performed, different articles, essays, journals, or other sources were collected in each thematic section, in order to broaden the scope of the problem space.



## PRIMARY RESEARCH PLAN

A primary research plan was used for primary research efforts which articulates intentions for conducting primary research, clarifying goals, methods, benchmark, sampling strategies.

### What is it you want to know?

- How much of the general public is currently considered “trained”
- Do untrained individuals feel capable of performing “rescue” in the event of a mass casualty?
- Are individuals aware of the impending threat of war between Russia and China? Do they feel prepared?
- How can we prepare the general public to be responsibly prepared for the case of a mass casualty in relation to war?
- What does war look like today? What kind of weapons are involved, vehicles, "soldiers", etc: How does it differ from the past?
- Is there an opportunity for AI integration?
- What does training look like for those enlisted in military
- What do current methods of transportation look like for the US military today?

**What type of info do you need to answer your questions? Who do you need to ask? How much info do you need to get a robust answer?**

- Facts and common knowledge about first response
- Testimonials- Veterans, First Responders, Medic, Civilians
- (Quantitative) Statistical data- characteristics of the US population
- Demographic information- Examine tendencies and behaviors

**How do you go about answering your questions? Which methodologies make the most sense? How/why per methodology?**

- Interviews: Collect opinions, testimonials, First-hand accounts of others' experiences
- Survey: Gather quantitative data and observe tendencies within specific demographics
- Secondary Research (Articles, journals, books, case studies, surveys, etc.): Gather general information about the topic, explore ideas adjacent to the topic, analyze existing surveys surrounding the topic

### Supporting Resources:

- Interview Guides
- Article Analysis
- Survey Question Guide



**Emergency Preparedness and Life-Saving Survey**

My name is Katie Bush, I'm a senior in Industrial Design at The Ohio State University. Below are questions pertaining to my thesis project where I am researching mass casualty response and transport, with an emphasis on emergency preparedness and life-saving maneuvers.

You are being invited to participate in a research study to assist students in OSU Design 5201. Your participation is voluntary which means you can choose whether or not you want to participate. You may withdraw at any time without penalty. All personal information will be anonymized. This research will involve multiple choice questions and should take no longer than 10 minutes to complete.

I understand that my participation in this study is entirely voluntary and that I may refuse to participate or may withdraw from the study at any time without penalty. I have read this entire form and I understand it completely. By filling out the information below, I am giving my consent to participate in this study.

Your participation is greatly appreciated.

If you have any questions, please contact: Katie Bush at Bush.521@buckeyemail.osu.edu

**Section 1: Demographic Information**

Gender Identity:  
 Male  
 Female  
 Non-binary  
 Prefer not to say  
 Other (please specify: \_\_\_\_\_)

Please select your age:  
 18 or under  
 19-29  
 30-39  
 40-49  
 50-59  
 60 and up

**Section 2: Life-Saving Maneuvers and Personal Experience**

Have you ever performed a rescue/life-saving maneuver on someone else?  
 Yes  
 No

At this current moment, do you feel as though you would be able to perform a rescue/life-saving maneuver if necessary?  
 Yes  
 No  
 Not sure

Have you ever experienced a rescue/life-saving maneuver firsthand or have you ever witnessed one take place?  
 Yes  
 No

If you answered "yes" to the previous question, how well prepared did the rescuers seem?  
 Very well prepared  
 Somewhat prepared  
 Not very prepared  
 Not at all prepared  
 N/A (I have not experienced a rescue)

Where does your knowledge (if any) of life-saving maneuvers come from? (Check all that apply)  
 School  
 Work  
 TV Shows/Movies  
 Video Games  
 Formal Training (CPR/First Aid Courses)  
 Online Resources  
 Other (please specify: \_\_\_\_\_)  
 None

**Section 3: Rescue Equipment and Physical Abilities**

Do you typically carry any types of rescue equipment on you? (e.g., band-aids, Narcan, antiseptic, water, etc)  
 Yes  
 No  
 Other \_\_\_\_\_

Do you have any physical disabilities that would present as an issue for carrying large amounts of weight?  
 Yes (please explain)  
 No

How much weight do you think you can carry over 50 yards? (in pounds)  
 Less than 10 lbs

## SURVEY DESIGN

10-20 lbs  
 21-30 lbs  
 31-40 lbs  
 More than 40 lbs  
 Not sure

**Section 4: Emergency Scenarios**

What kind of emergency scenarios do you feel prepared for? (Check all that apply)  
 Fire drill  
 Tornado drill  
 Earthquake  
 Active shooter  
 Medical emergencies  
 Other (please specify: \_\_\_\_\_)  
 None

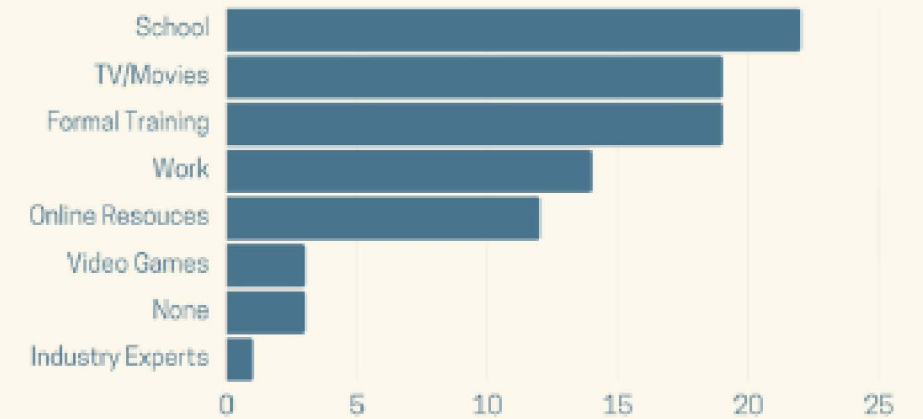
If you answered "yes" to the previous question, where did this emergency preparation take place?  
 School  
 Work  
 TV Shows/Movies  
 Video Games  
 Formal Training (CPR/First Aid Courses)  
 Online Resources  
 Other (please specify: \_\_\_\_\_)  
 I answered "no" to previous question

**Section 5: New Technologies**

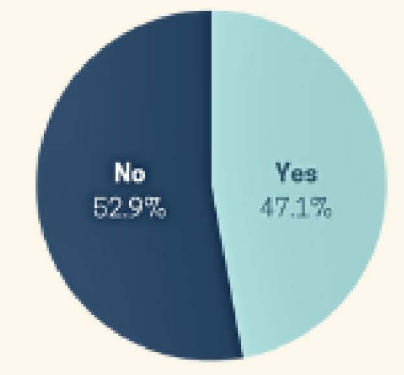
Have you ever used an AI-driven tool, such as ChatGPT?  
 Yes  
 No  
 Unsure

On a scale from 0-5, how interested are you in incorporating AI into your everyday work and life? (0=not interested at all, 5=very interested)  
 Yes  
 No  
 Unsure

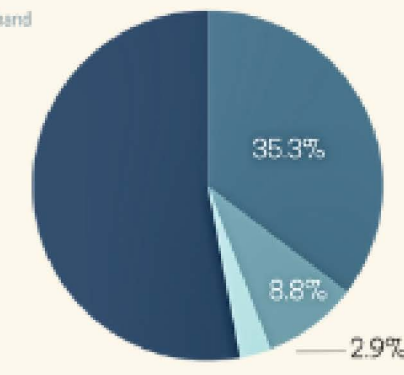
Survey questions were administered via Google Forms between September 6th and September 7th, 2023. The survey was published to social media platforms including Snapchat, Instagram, and Facebook.



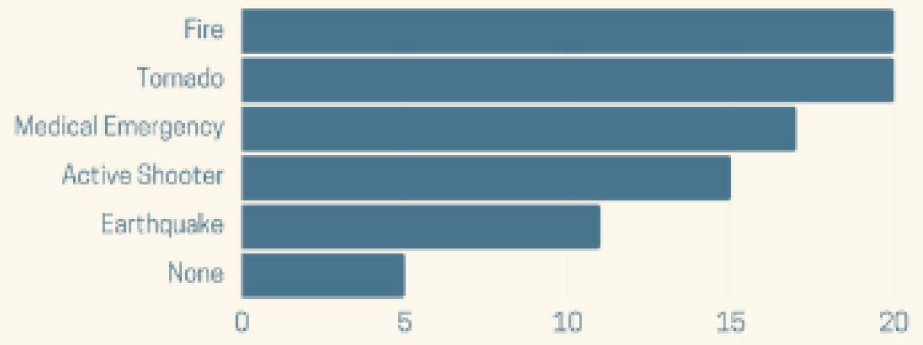
Most of the individuals' knowledge of life-saving maneuvers comes from school, TV or movies, and formal training.



47.1% of individuals have experienced or witnessed a life-saving maneuver firsthand.



35.3% of those with firsthand encounters of life-saving maneuvers reported that responders seemed "very well prepared".

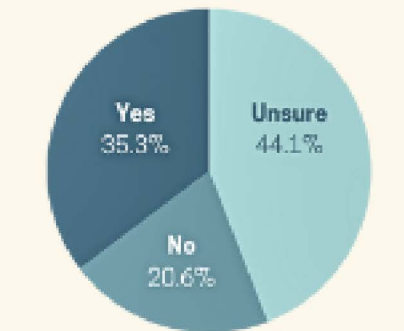


The individuals feel most prepared for fire, tornado, and medical emergencies. The individuals feel the least prepared for earthquake emergencies.

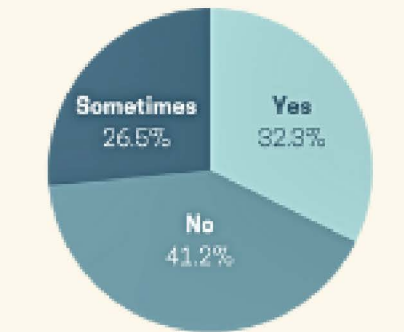
The resulting sample consisted of 9 males, 23 females, and 2 non-binary individuals, 18 years of age or older, living in the continental United States.

# 11.8%

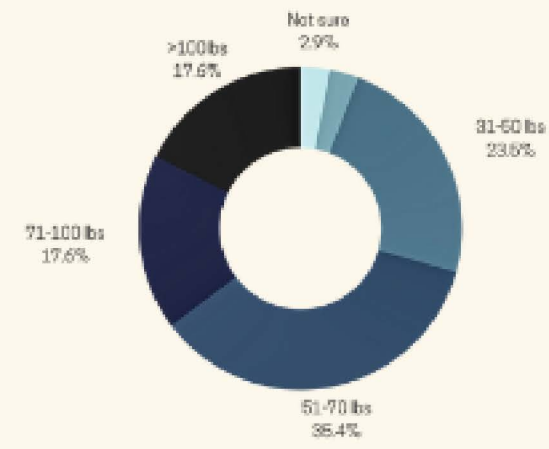
of individuals have performed a life-saving maneuver on someone before.



35.3% of individuals feel able to perform a life-saving maneuver if necessary.



32.3% of individuals carry rescue equipment (narcan, bandaids, water) on a day-to-day basis.



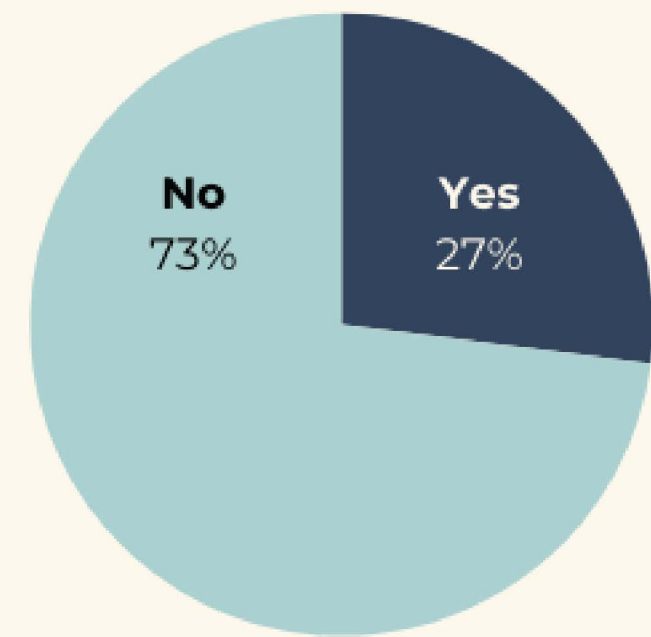
35.4% of individuals believe that they can carry 51-70 lbs. of weight for 50 yards.

# 58.8%

of individuals have used an AI tool such as ChatGPT in the past.

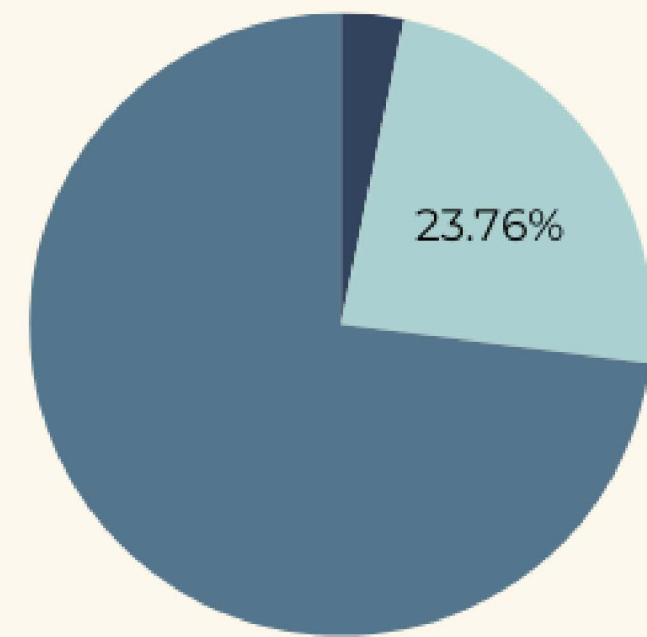


Many public spaces **do not have** the necessary emergency response equipment they need



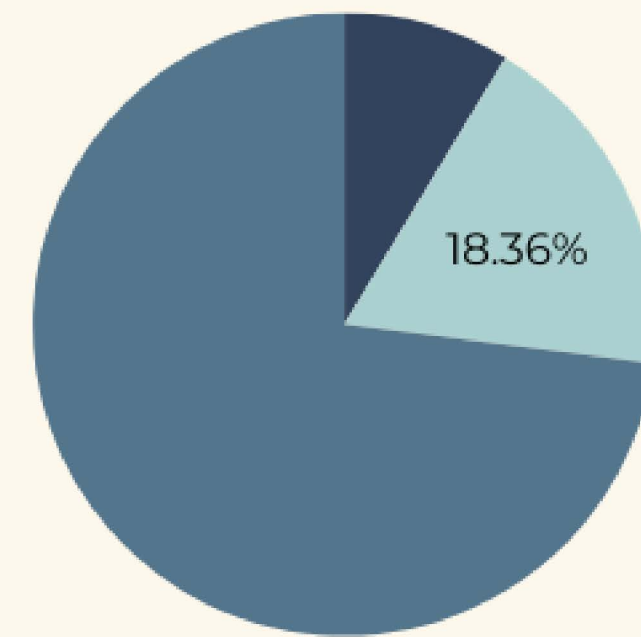
Only 27% of individuals have an automated external defibrillator (AED) located within their place of work.

If spaces have this equipment, many individuals **do not know where it is**

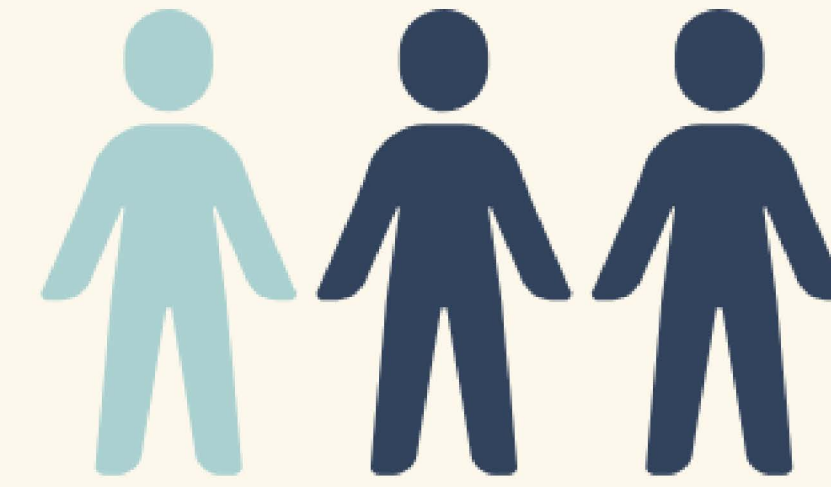


23.76% of individuals who have an automated external defibrillator (AED) at their place of work know where it is.

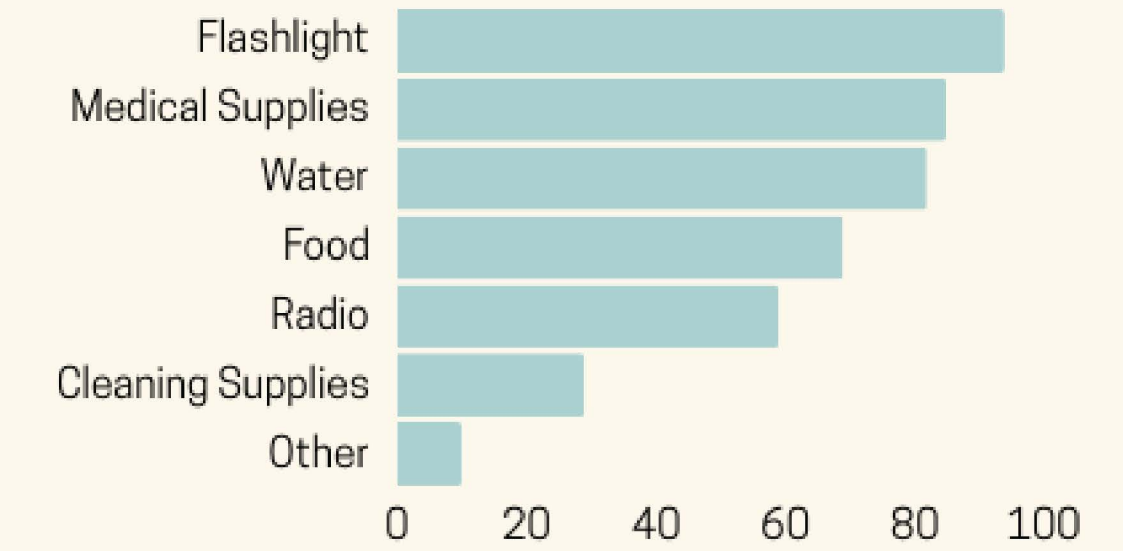
If individuals know where the equipment is, many **do not know how to use it.**



18.36% of individuals who have an automated external defibrillator (AED) at their place of work know how to use it.



1 in 3 respondents had an emergency supply kit.



The most common items in their kit were a flashlight, medical supplies, and water.



Those living in the Midwest were 44% less likely to have an emergency supply kit than those in Southern states.

3X

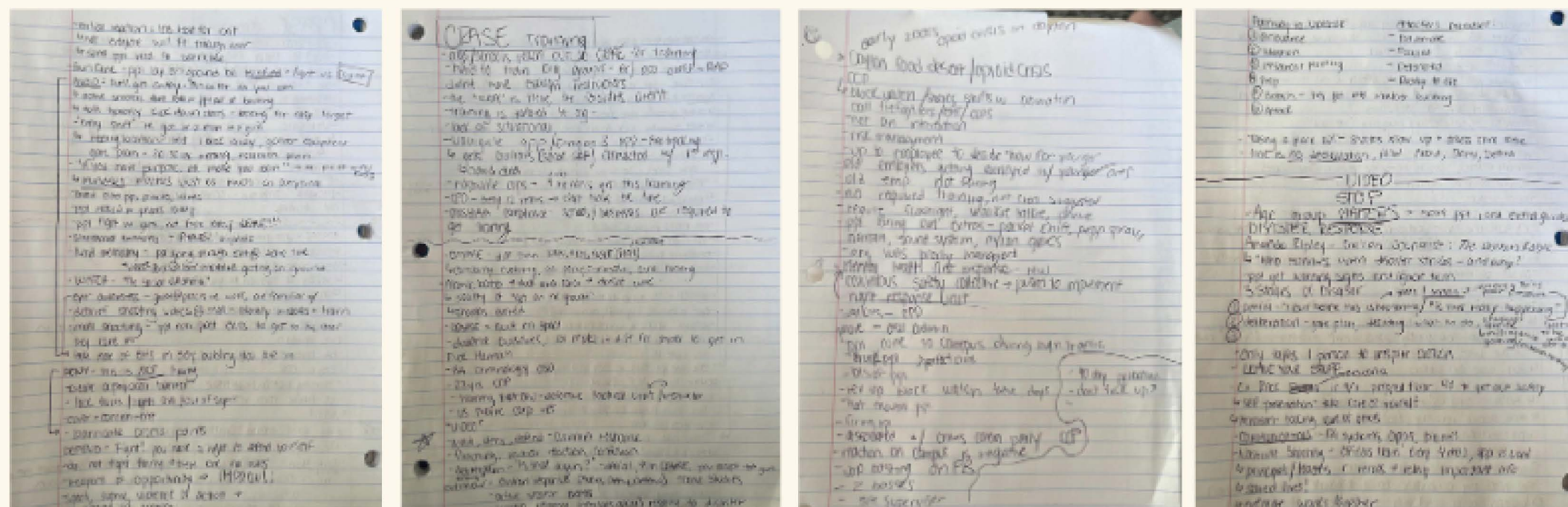
Those who believe that an emergency supply kit will improve their chance of surviving a disaster are more than three times as likely to have a kit.



## INTERVIEWS WITH INDUSTRY EXPERTS

Interviews were conducted with six (6) industry experts including:

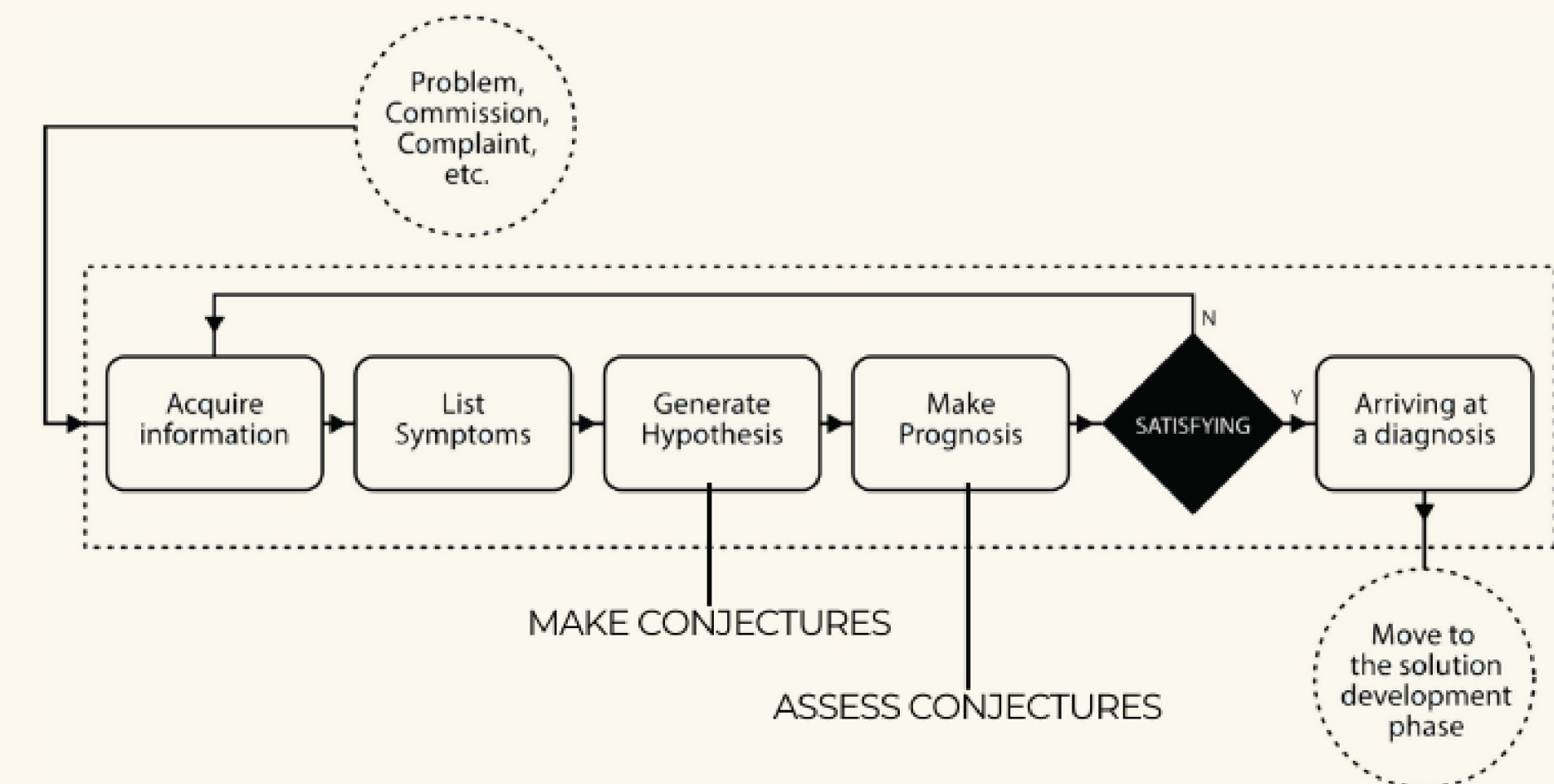
- CPD Policeman
- Buckeye Block Watch
- CRASE Emergency Response Trainer
- FEMA Urban Search and Rescue
- Medical Team Manager, Ohio Task Force 1
- Clinical-Professor of Emergency Medicine



## PROBLEMATIZATION: DDX METHODOLOGY

Drawing off of the Differential Diagnosis method (DDx) used in clinical medicine to identify the source of symptoms, the process can be leveraged within design to “provide a framework to support designers in mingling their intuitions with factual evidences and structure the task of problem identification” (Proulx).

The five step model shown below facilitates a systematic approach to diagnosing a problematic by using the observations, or “symptoms,” gathered from research to generate conjectures, or “hypotheses.”



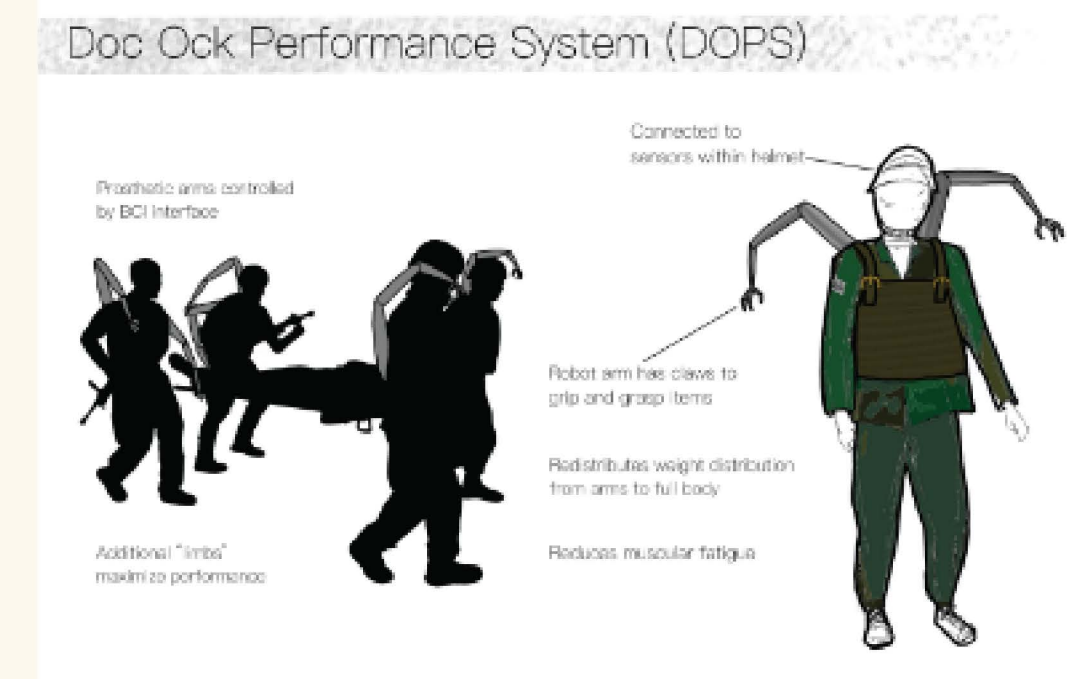
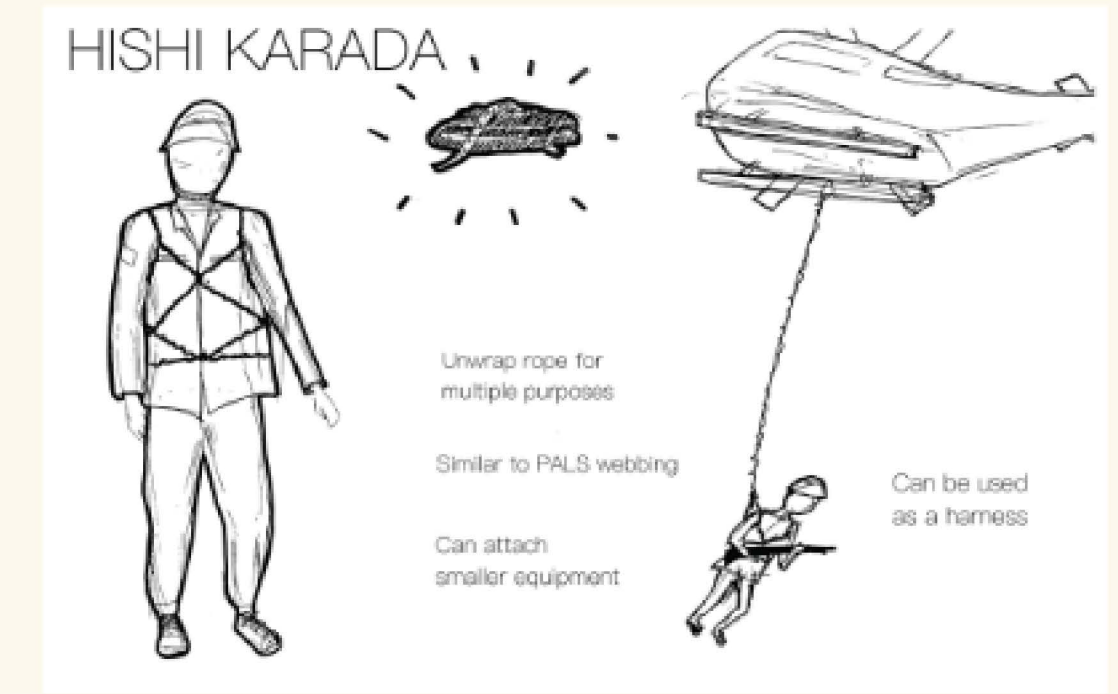
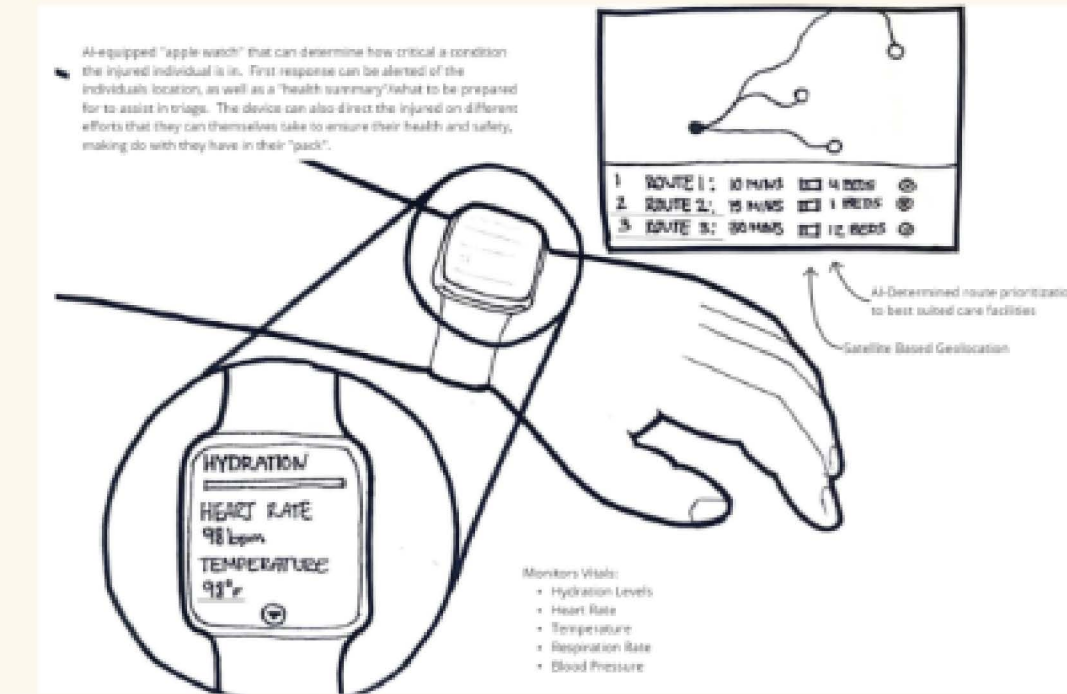


The design conjectures produced strictly served as a research instrument for discerning the advantages and disadvantages of certain facets within each approach.

They are not intended to be potential solutions or concepts by any means, as they are informed by limited preliminary research.

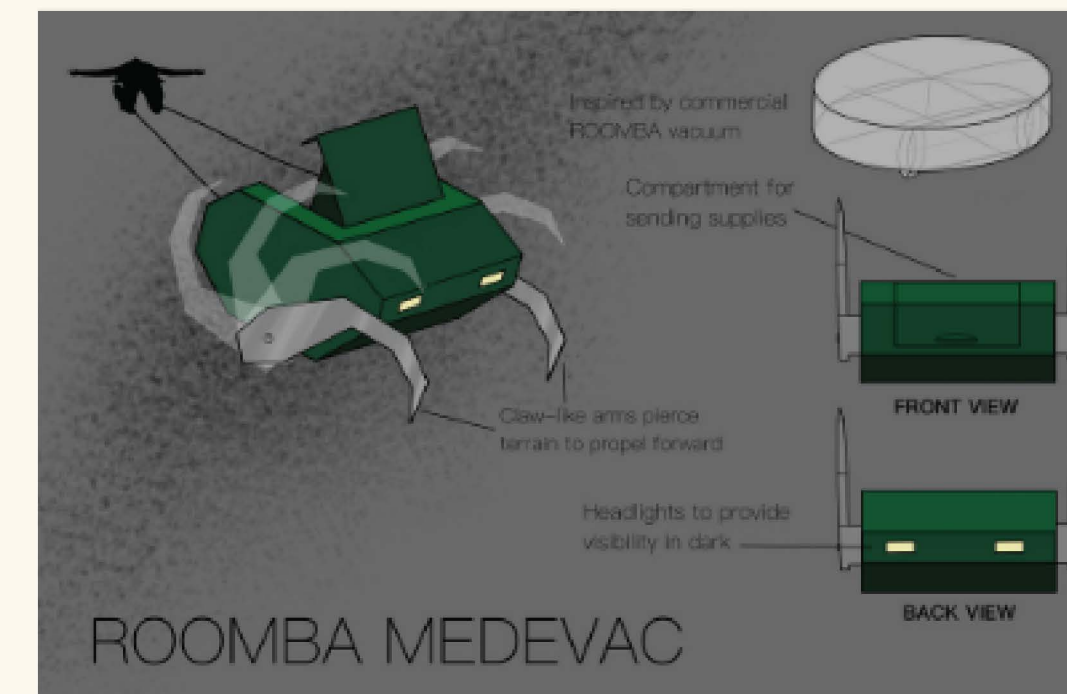
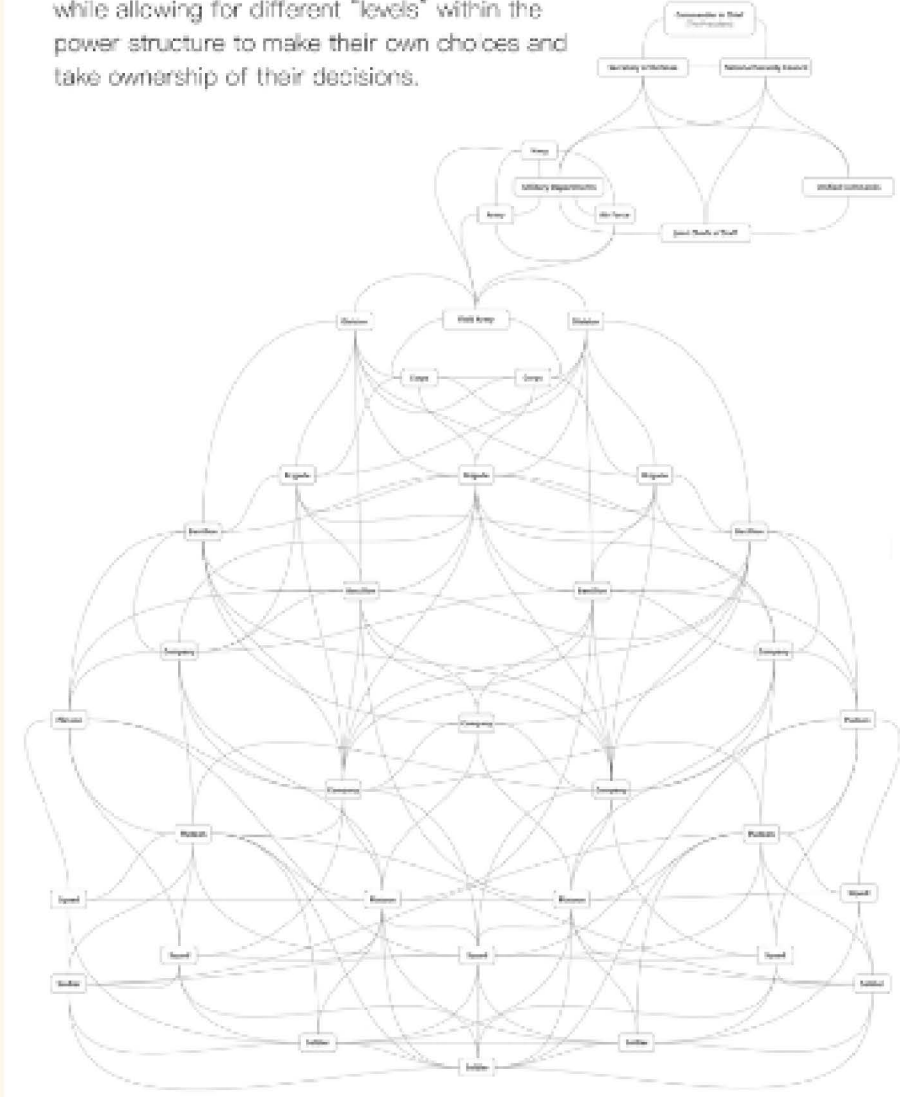
Analysis of these conjectures spurred additional idea generation and offered numerous insights that would further inform the diagnosis of the design problematic.

Though the original problem space was surrounding military personnel, insights from these conjectures were able to be applied to the final problem space.



### US Defense- Decentralized Chain of Command

With a decentralized chain of command, power structures are still generally maintained while allowing for different "levels" within the power structure to make their own choices and take ownership of their decisions.

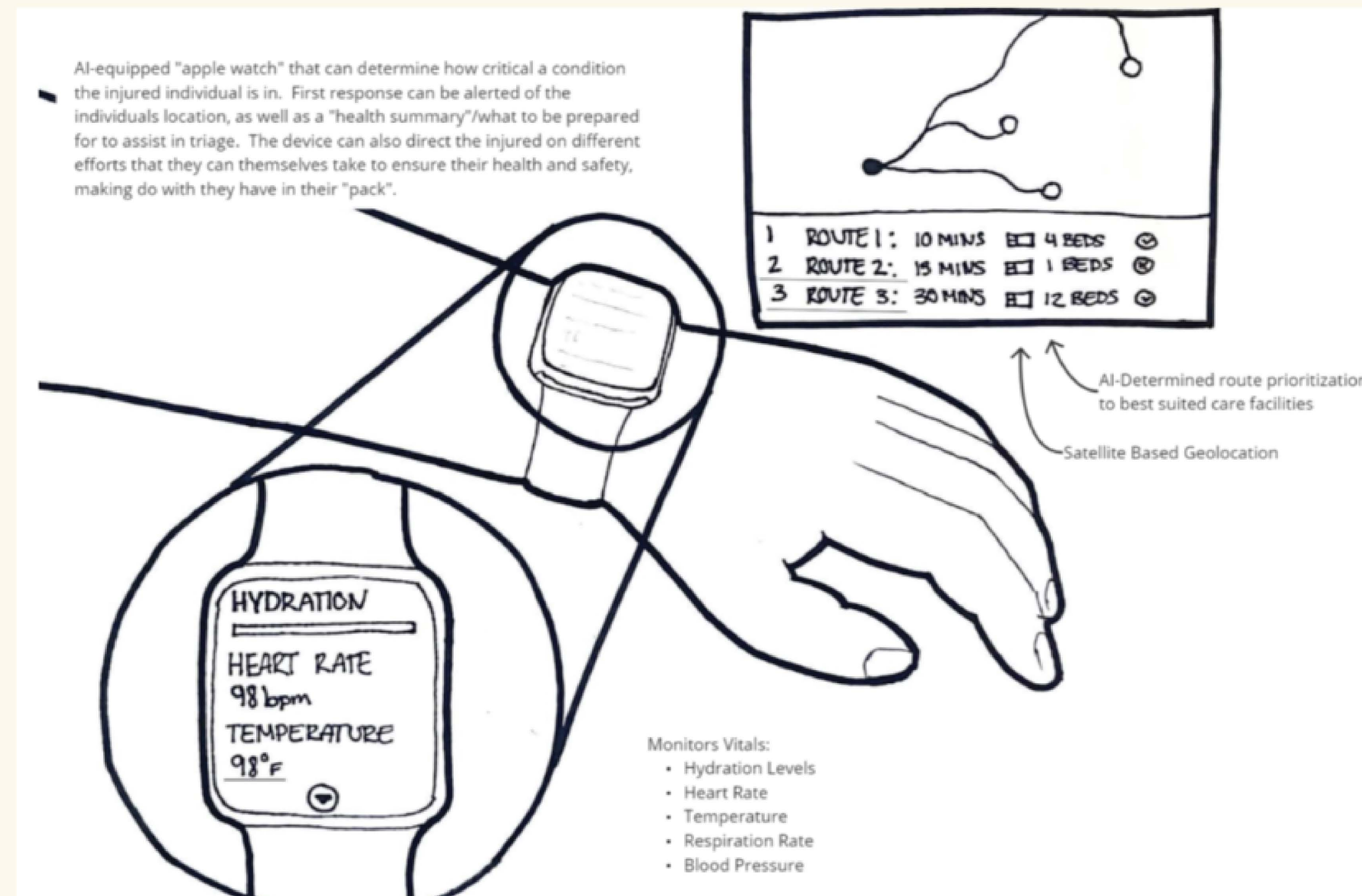




## 1) LIST SYMPTOMS:

- Assessing condition of injured takes time
- Injury condition deteriorates with time
- Locating injured can be difficult in certain circumstances

## 2) GENERATE HYPOTHESIS:



## 1) LIST SYMPTOMS:

- Assessing condition of injured takes time
- Injury condition deteriorates with time
- Locating injured can be difficult in certain circumstances

## 2) GENERATE HYPOTHESIS:

## 3) MAKE PROGNOSIS:

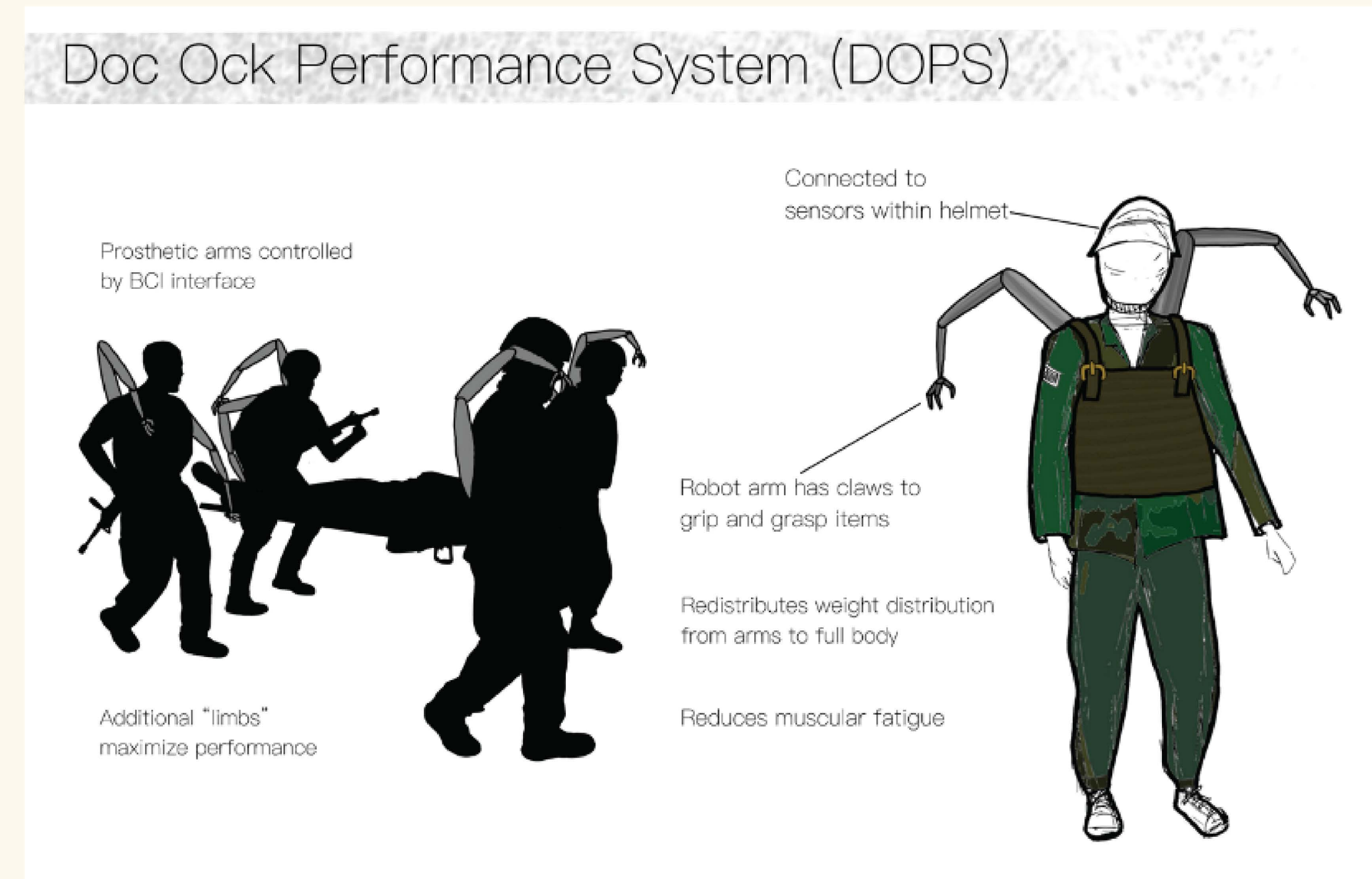
- AI can assist in the gathering, collection, and distribution of important data
- Wearables ensure device is immediately accessible
- Information given to first responders before their arrival can decrease time spent assessing conditions after they arrive
- When panicked, individuals may struggle with inputting any information on a small screen
- Electronics can fail



## 1) LIST SYMPTOMS:

- One military medic often treats several injured individuals on field
- Medics are vulnerable to danger when treating individuals
- Exhaustion can occur when carrying the injured for a long period

## 2) GENERATE HYPOTHESIS:



## 1) LIST SYMPTOMS:

- One military medic often treats several injured individuals on field
- Medics are vulnerable to danger when treating individuals
- Exhaustion can occur when carrying the injured for a long period

## 2) GENERATE HYPOTHESIS:

Doc Ock Performance System (DOPS)

## 3) MAKE PROGNOSIS:

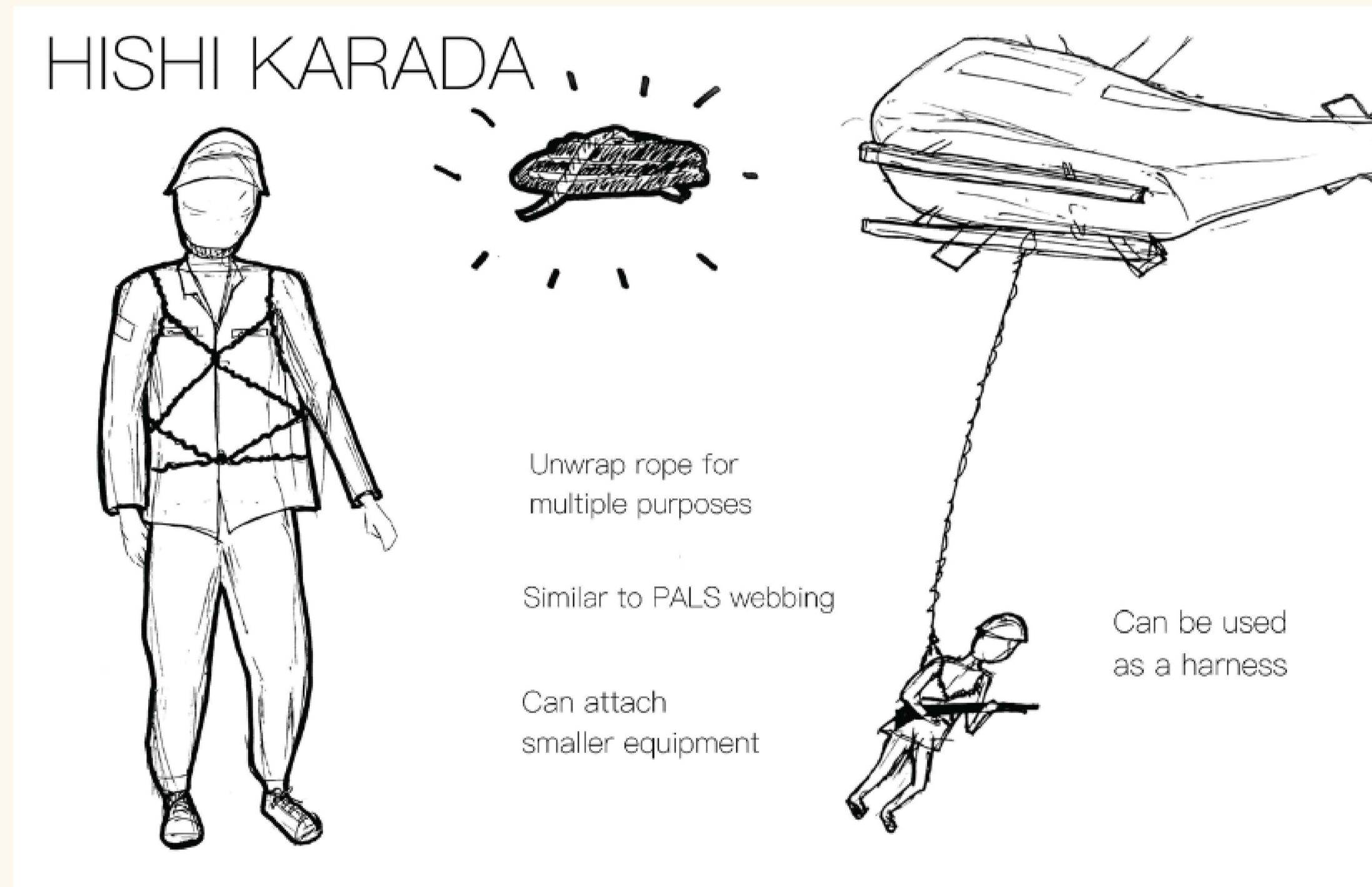
- Additive technology or adaptive prosthetics can reduce muscle strain
- Automating physical labor in any way allows for medics to further focus on injury response
- Additional gear can be cumbersome for military medics, who typically carry heavier "packs" than other military personnel
- Electronics can fail



## 1) LIST SYMPTOMS:

- Combat Medics must carry additional equipment
- Equipment and/or “packs” are getting heavier each year
- PALS webbing is currently used on military gear to store equipment
- Equipment may be hard to reach on PALS webbing

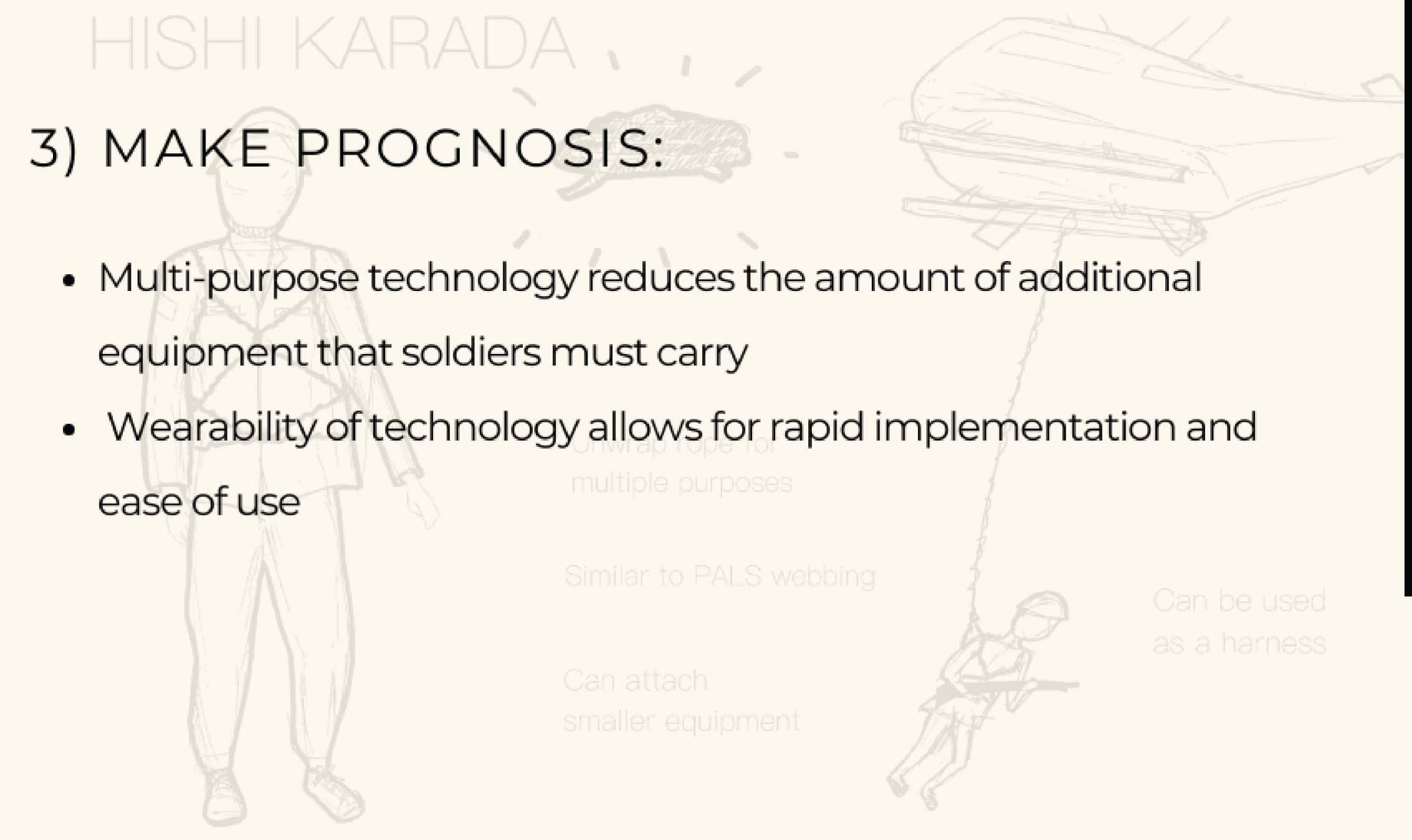
## 2) GENERATE HYPOTHESIS:



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## 2) GENERATE HYPOTHESIS:



## 3) MAKE PROGNOSIS:

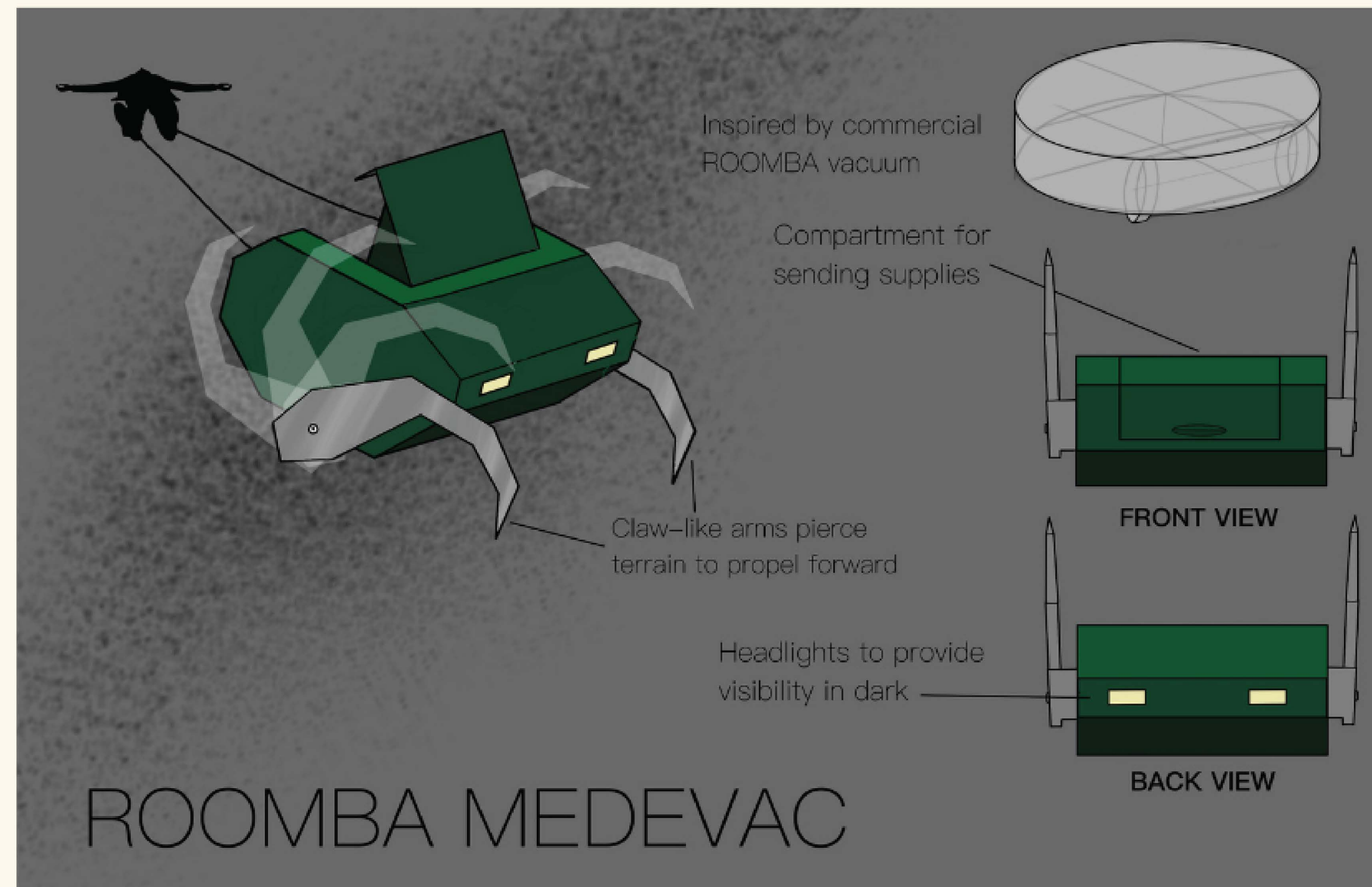
- Multi-purpose technology reduces the amount of additional equipment that soldiers must carry
- Wearability of technology allows for rapid implementation and ease of use



### 1) LIST SYMPTOMS:

- Assessing condition of injured takes time
- Injury condition deteriorates with time
- Locating injured can be difficult in certain circumstances

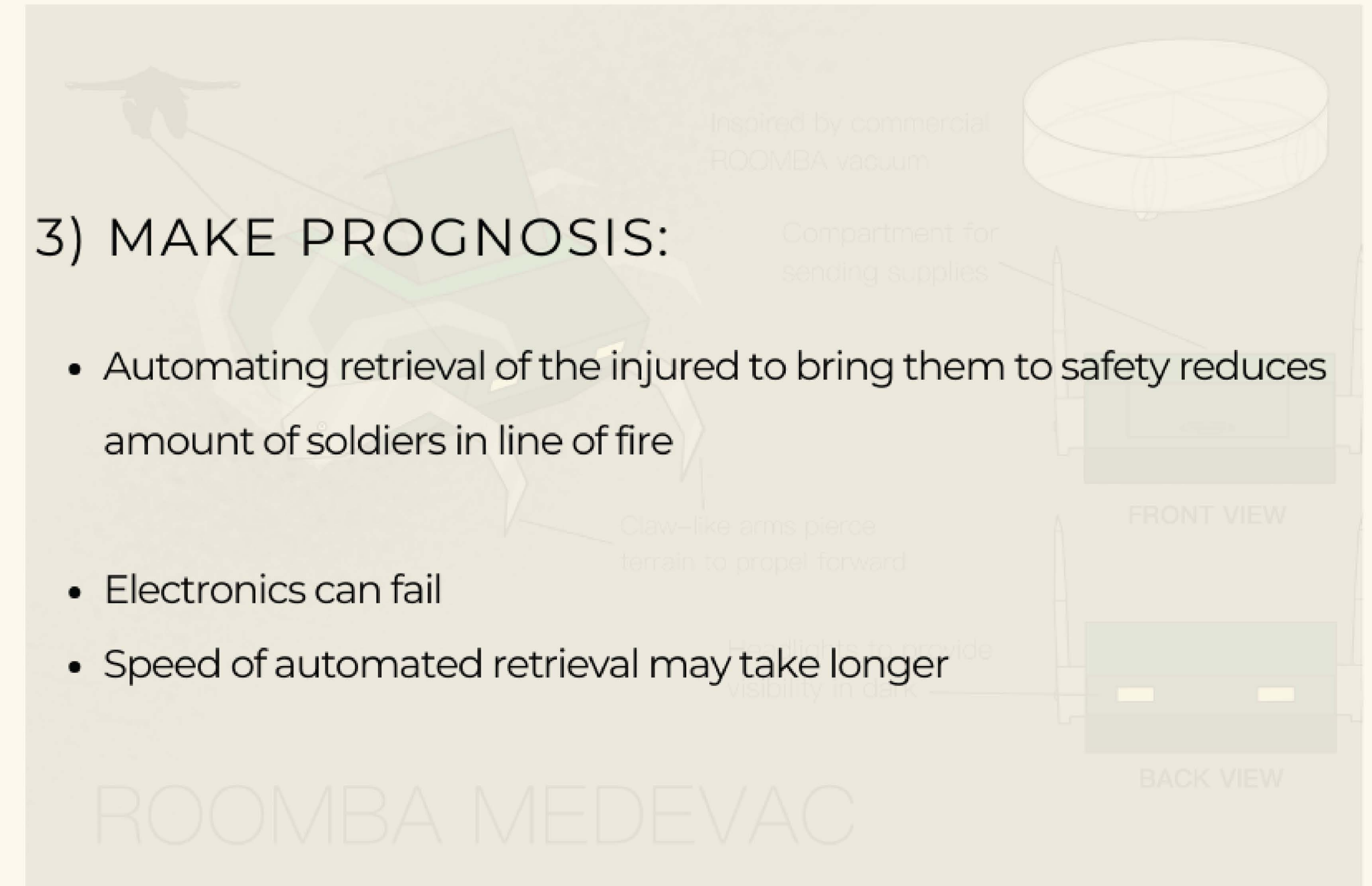
### 2) GENERATE HYPOTHESIS:



### 1) LIST SYMPTOMS:

- Certain terrain is difficult to navigate on foot
- Those retrieving injured are prone to injury themselves

### 2) GENERATE HYPOTHESIS:



### 3) MAKE PROGNOSIS:

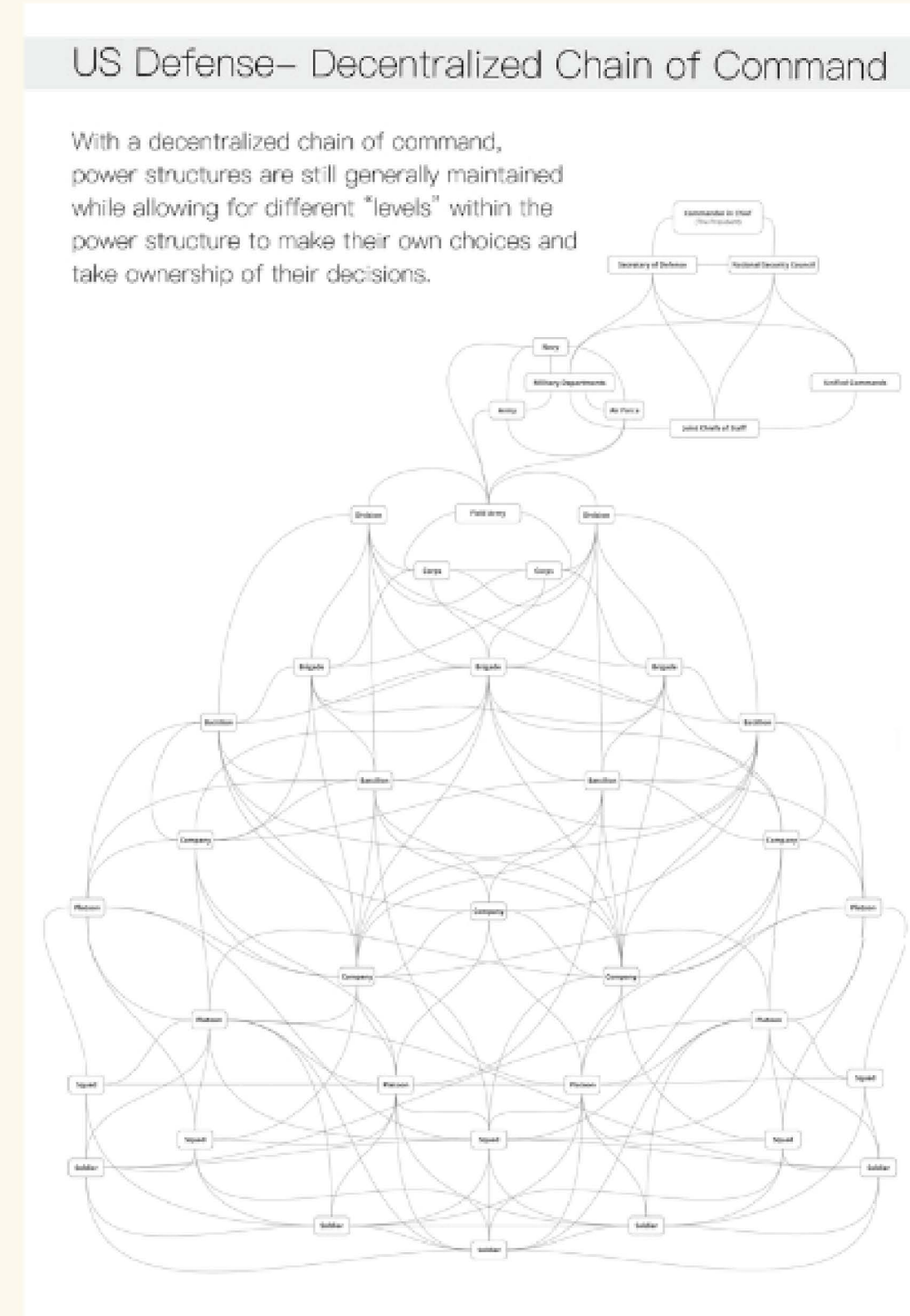
- Automating retrieval of the injured to bring them to safety reduces amount of soldiers in line of fire
- Electronics can fail
- Speed of automated retrieval may take longer



## 1) LIST SYMPTOMS:

- Decision making during crisis can take time
- “Lower level” individuals may receive important information later than “Higher level” individuals
- Centralized power structures are traditionally utilized

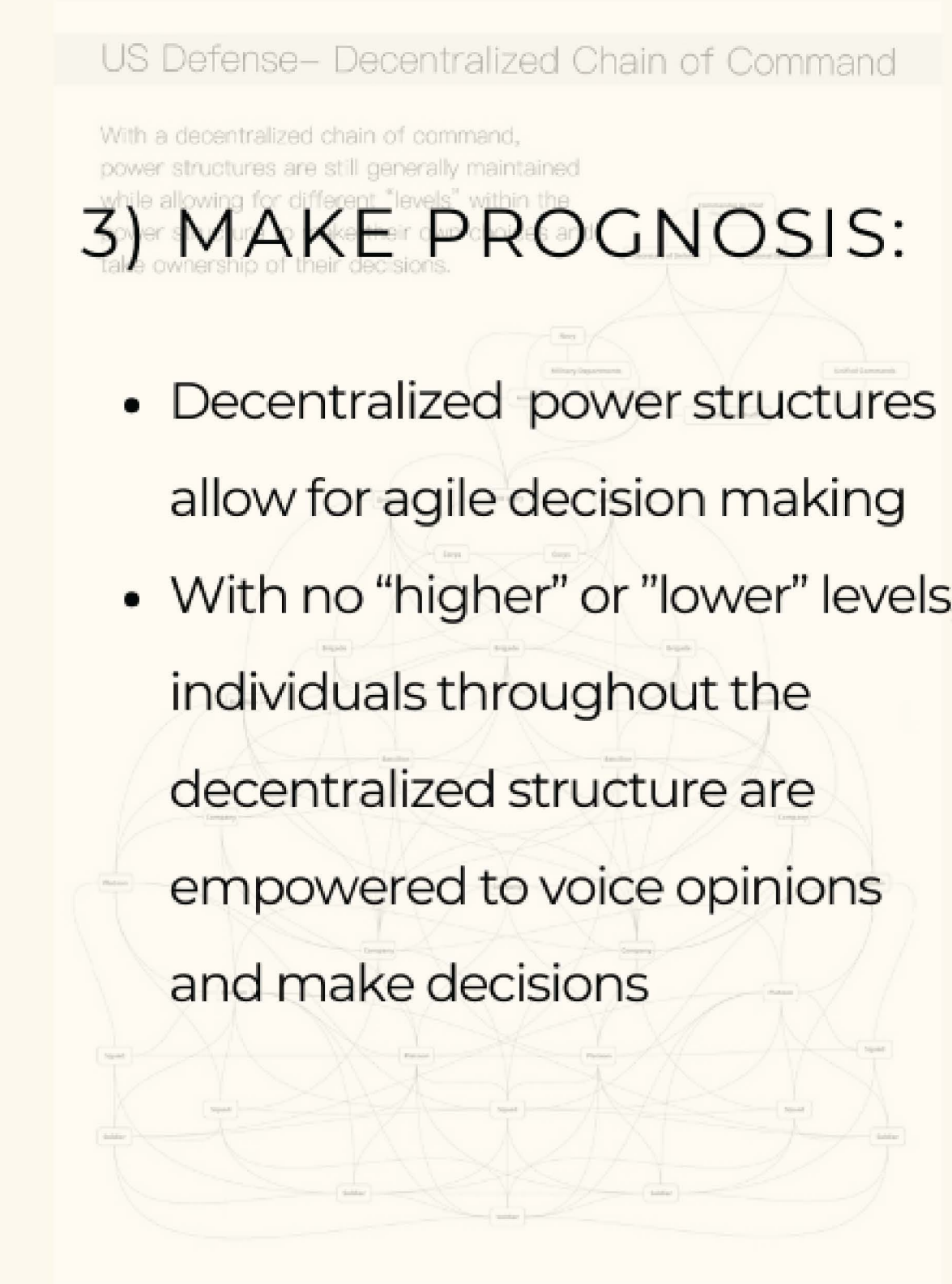
## 2) GENERATE HYPOTHESIS:



## 1) LIST SYMPTOMS:

- Decision making during crisis can take time
- “Lower level” individuals may receive important information later than “Higher level” individuals
- Centralized power structures are traditionally utilized

## 2) GENERATE HYPOTHESIS:





## REFFINING THE **PROBLEMATIC**

Given that when Mass Casualty Incidents (MCI) occur, many untrained individuals (aka. Primary Responders) lack the resources that they need to respond.

How can we provide the necessary resources to these individuals in order to supplement their primary response and transport injured individuals to safety?

## DESIGN **CONJECTURES**

Conducting comprehensive background research, involving both primary and secondary sources, resulted in a more nuanced comprehension of the underlying issue.

This, in turn, prompted the development of design conjectures within four identified areas of opportunity, informed by insights derived from the background research.

Areas of Opportunity:

**Training** on how to use emergency resources

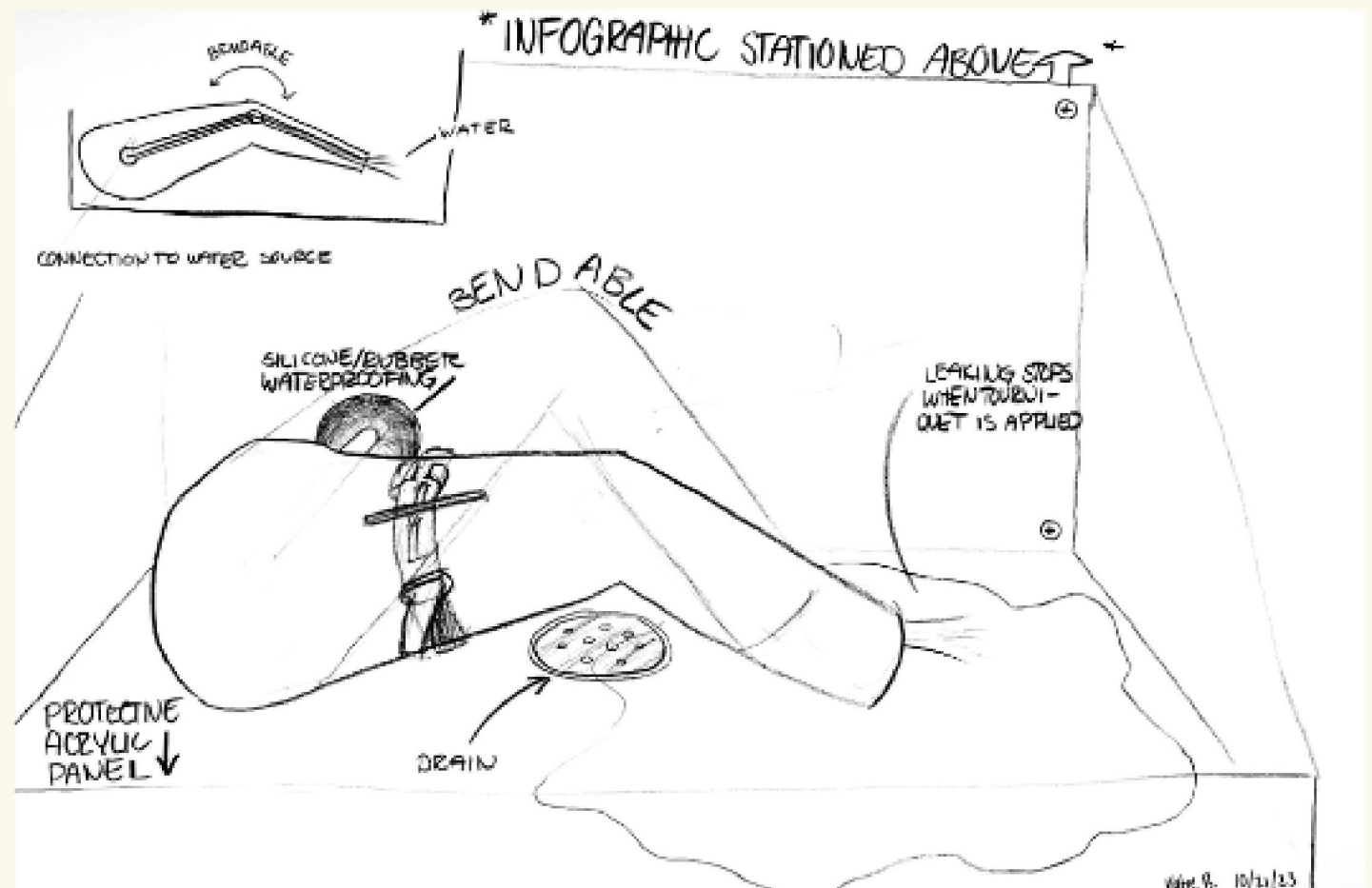
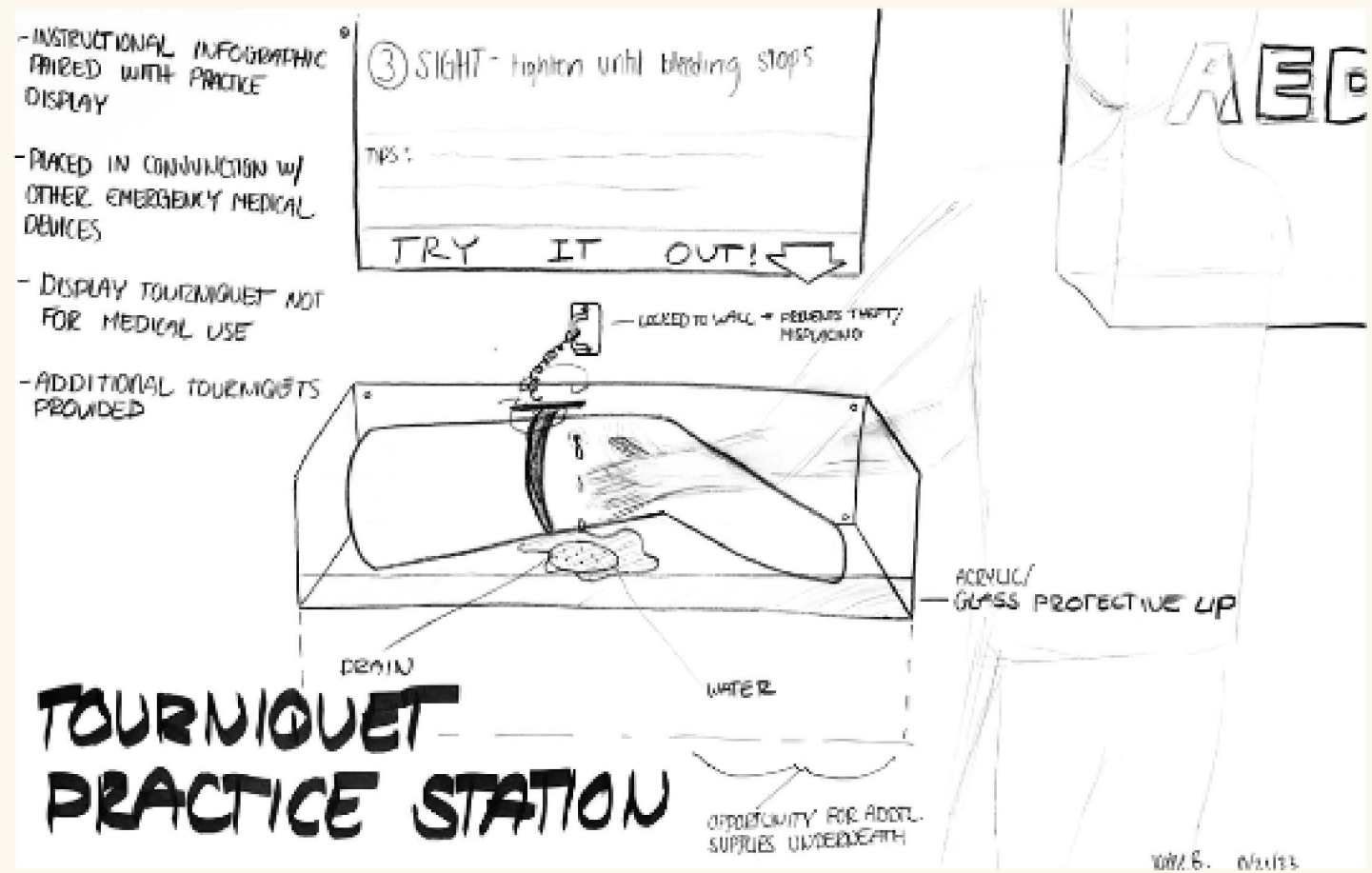
**Delivery** of resources to scene of incident

**Wayfinding** to resources

**Improvisation** surrounding the use of resources



## Training on how to use emergency resources



Preparation for Mass Casualty Incidents (MCI) often requires training, which many lack. The Tourniquet Practice Station, inspired by airport CPR practice setups, offers quick, simplified training within minutes, bringing life-saving skills directly to individuals without the need for formal training locations

### Pros:

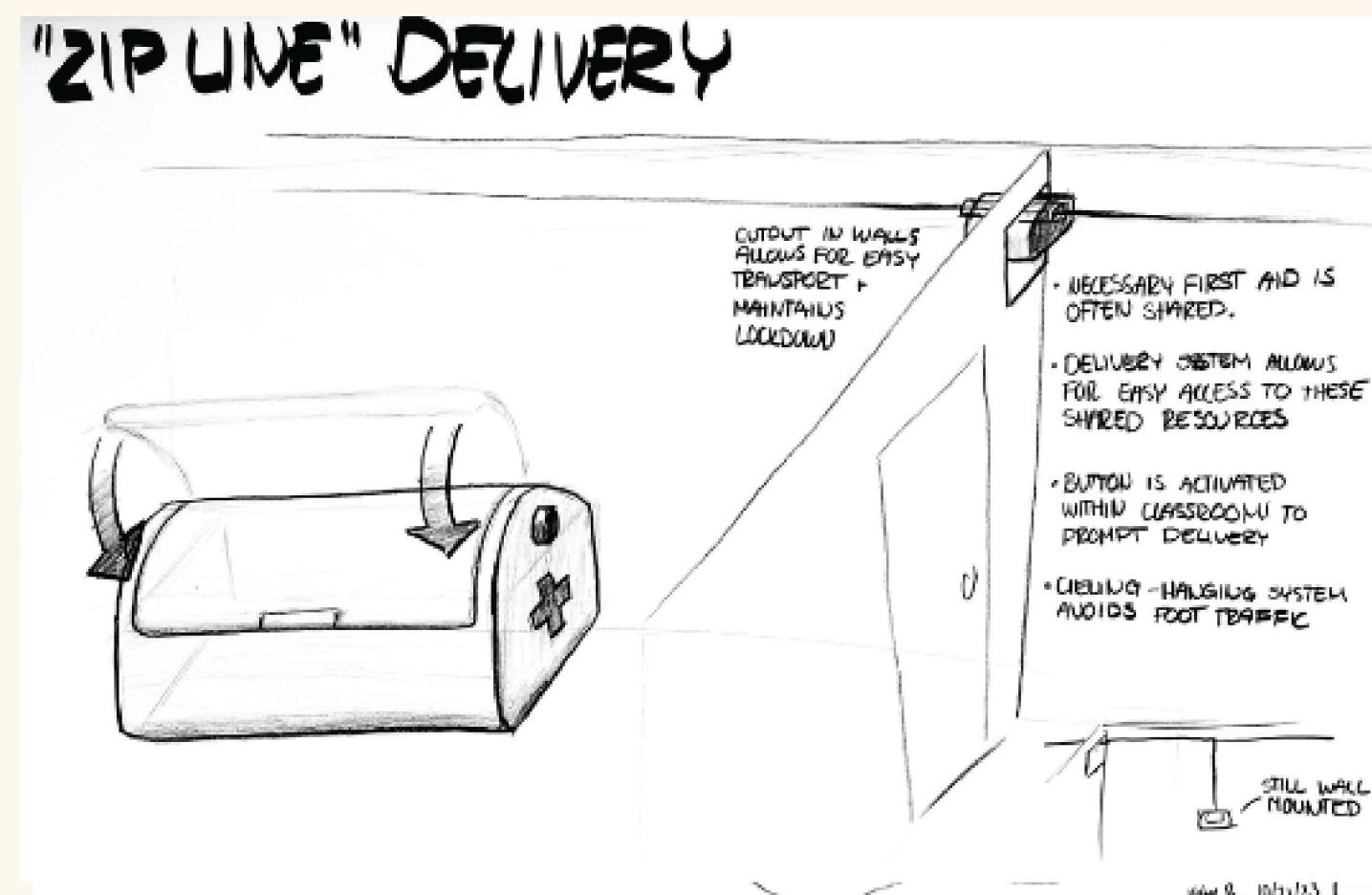
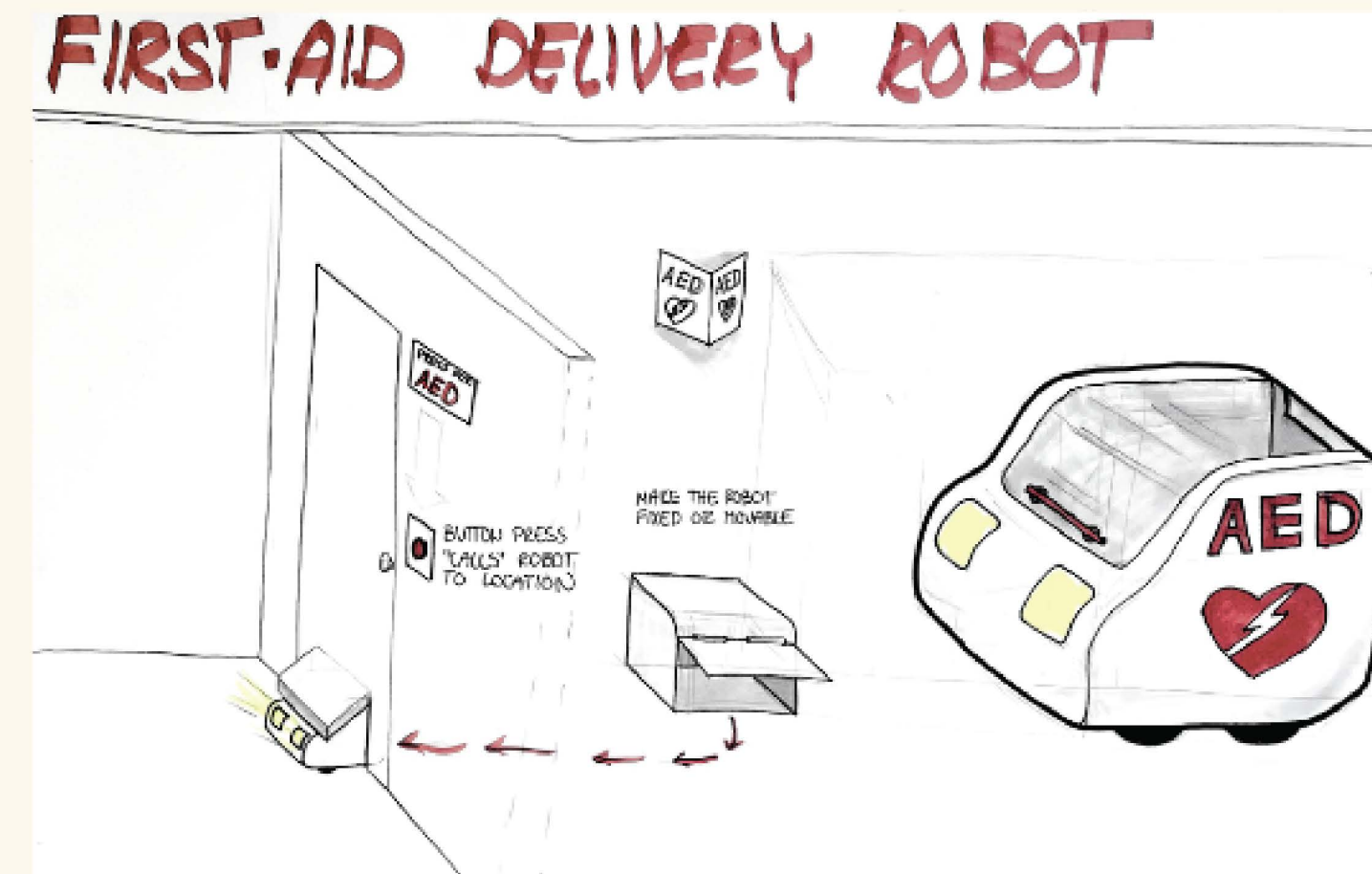
- Less formalized training
- On-site training
- Quick training
- No trainers necessary
- Simplified model- not gruesome

### Cons:

- Does not capture the "stress factor"
- No requirement for use- does not fully ensure training will happen



**Delivery** of resources to scene of incident



**Pros:**

- Maintains safety in the case of a lockdown
- No retrieval of equipment required
- Ceiling-mounted delivery is unaffected by foot traffic

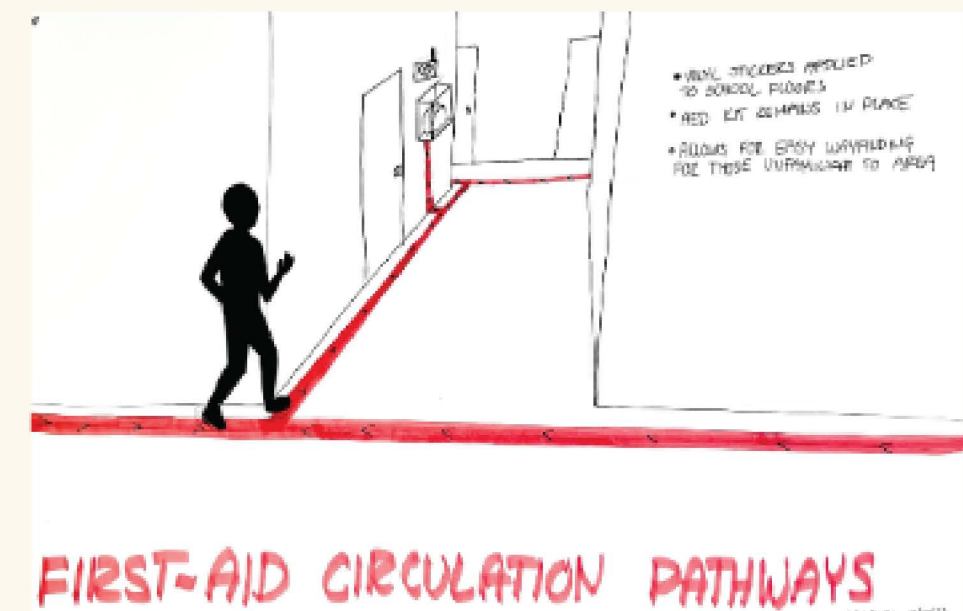
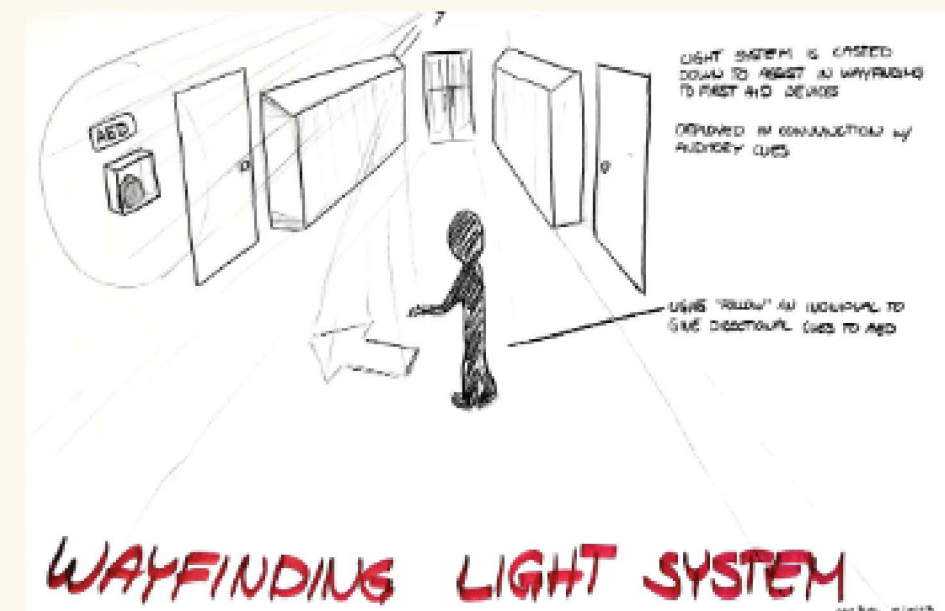
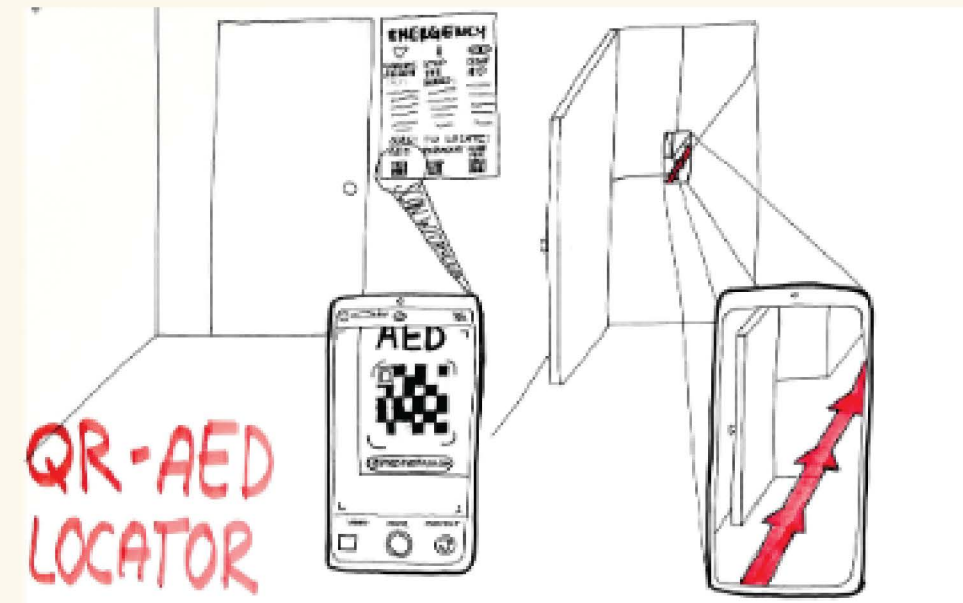
**Cons:**

- Only one person can use equipment
- May have trouble navigating traffic in hallways
- Limited to one floor
- Requires training/awareness
- Ceiling-mounted delivery would require structural changes to building
- Ceiling-mounted delivery is difficult to reach upon arrival

In mass casualty incidents (MCI), responders often face delays and safety risks while fetching necessary equipment for the injured. A delivery system removes the need for retrieval, ensuring essential devices are promptly brought to the scene.



## Wayfinding to resources



### Pros:

- No memorization of maps
- Real-time navigation
- Built upon existing system of equipment

### Cons:

- Apps only available to those with watches/smartphones
- Apps take time to set up
- Technology can fail
- Auditory senses can be affected by stress
- Circulation pathways may elicit fear in students
- Light-led guidance can lead to an easy target

Existing systems for locating equipment during mass casualty incidents (MCI) are confusing and insufficient, often relying on memorization of maps. This poses challenges, particularly for those unfamiliar with specific areas. Enhanced wayfinding is crucial to ensure straightforward and swift navigation to the required equipment, expediting the response to the injured.



## Improvisation surrounding the use of resources



### Pros:

- Immediate access
- Everyday use instills familiarity
- Supports improvisation

### Cons:

- Requires training/awareness
- May not perform as well as equipment designed for MCI

When individuals lack the necessary training, expertise, and experience for Mass Casualty Incident (MCI) response, they often rely on improvisation using available knowledge and resources to aid the injured. However, this improvised response, due to insufficient equipment and training, can lead to additional injuries. Introducing everyday devices that complement such improvisation enables those on the scene to immediately utilize available resources for an effective response.



## FORMATIVE ASSESSMENT

### Where is litter-to-chair conversion useful?

**Methodology:** 1:1 scale prototype movement test through different environments with 2 “rescuers”

**Indicators:** Pausing, Bumping, Slowing down, Converting from flat litter to chair

**Sampling Strategy:** Sample is untrained in MCI, test conducted within school environment`

**Results:** Hinges allow for “auto leveling” of injured, movement slowed over stairs, conversion took place “automatically”, top subject hands slip when converted to chair, hits chair shape on slope, hits litter shape on flat land, top folds before bottom at slopes, stored in car in completely folded shape.

**Take Away:** The chair functionality is best used over stairs or harsh slopes, 2 rescuers are required to lift off ground, allowing for “L” shape is useful for small set of stairs, allowing smooth, dynamic transition between litter/chair proved useful, design worked best with taller rescuer at bottom (better leveling), collapsibility proved useful for transport/storage

### How does weight behave in Stair Chair Stretcher

**Methodology:** 1:1 scale prototype weight test through different environments with different weight levels with 2 “rescuers” by observing the behavior of the rescuers and the weight itself

**Indicators:** Weight shifting, falling, staying in place, Rescuers re-gripping, pausing, struggling

**Sampling Strategy:** Sample is untrained in MCI, test conducted within school environment`

**Results:** Weight falling forward during conversion to chair, weight shifting downwards during conversion to litter, rescuers using one hand to recenter weight

**Take Away:** for “dead weight”, the conversion from litter to chair and back leads to sliding and falling forward. Straps or additional securing measures may need to be taken.





## PROJECT DEVELOPMENT

When Mass Casualty occurs, **Primary Responders** often intervene before first response teams arrive, yet lack the necessary resources to respond.

During an emergency evacuation, those with mobility impairments need additional assistance or devices, such as **stair chairs** to navigate stairwells.

These devices are bulky and expensive, and often reserved for EMS/EMT.

**How can we provide the necessary equipment to primary responders in order to supplement evacuation efforts before first response teams arrive?**

### Mass Casualty Incident (MCI) Timeline



Incident Occurs



Call EMS



Get to Safety



Self Aid or  
Buddy Aid



Evacuation



A **stair chair** is a device designed to transport the mobility impaired throughout stairwells.

These devices often take the shape of a chair form, and range in price and function.

Due to the high price point of stair chairs, as well as the bulkiness and weight of the devices, they are often only accessible by EMS and EMT.

By equipping bystanders with the proper resources in public spaces, those on scene will be able to assist in emergency scenarios before first response teams arrive.



Visually non-intimidating ☆☆☆	Visually non-intimidating ☆☆☆	Visually non-intimidating ☆☆☆	Visually non-intimidating ☆☆☆	Visually non-intimidating ☆☆☆
Softness ☆	Softness ☆☆☆	Softness ☆	Softness ☆☆☆	Softness ☆☆☆
Intuitiveness ☆	Intuitiveness ☆☆☆	Intuitiveness ☆☆☆	Intuitiveness ☆☆☆	Intuitiveness ☆☆☆
Durability ☆☆☆	Durability ☆☆☆	Durability ☆☆☆	Durability ☆☆☆	Durability ☆☆☆
Packability/storability ☆	Packability/storability ☆☆☆	Packability/storability ☆☆☆	Packability/storability ☆☆☆	Packability/storability ☆☆☆
Required Manpower ☆☆☆	Required Manpower ☆☆☆	Required Manpower ☆☆☆	Required Manpower ☆☆☆	Required Manpower ☆☆☆
Manipulatability ☆☆☆	Manipulatability ☆☆☆	Manipulatability ☆☆☆	Manipulatability ☆☆☆	Manipulatability ☆☆☆
Rapid deployment ☆☆☆	Rapid deployment ☆☆☆	Rapid deployment ☆☆☆	Rapid deployment ☆☆☆	Rapid deployment ☆☆☆
Lightweight ☆☆☆	Lightweight ☆☆☆	Lightweight ☆☆☆	Lightweight ☆☆☆	Lightweight ☆☆☆
Visually non-intimidating ☆☆☆	Visually non-intimidating ☆☆☆	Visually non-intimidating ☆☆☆	Visually non-intimidating ☆☆☆	Visually non-intimidating ☆☆☆
Softness ☆	Softness ☆☆☆	Softness ☆☆☆	Softness ☆☆☆	Softness ☆☆☆
Intuitiveness ☆	Intuitiveness ☆☆☆	Intuitiveness ☆☆☆	Intuitiveness ☆☆☆	Intuitiveness ☆☆☆
Durability ☆☆☆	Durability ☆☆☆	Durability ☆☆☆	Durability ☆☆☆	Durability ☆☆☆
Packability/storability ☆	Packability/storability ☆☆☆	Packability/storability ☆☆☆	Packability/storability ☆☆☆	Packability/storability ☆☆☆
Required Manpower ☆	Required Manpower ☆☆☆	Required Manpower ☆☆☆	Required Manpower ☆☆☆	Required Manpower ☆☆☆
Manipulatability ☆	Manipulatability ☆☆☆	Manipulatability ☆☆☆	Manipulatability ☆☆☆	Manipulatability ☆☆☆
Rapid deployment ☆☆☆	Rapid deployment ☆☆☆	Rapid deployment ☆☆☆	Rapid deployment ☆☆☆	Rapid deployment ☆☆☆
Lightweight ☆☆☆	Lightweight ☆☆☆	Lightweight ☆☆☆	Lightweight ☆☆☆	Lightweight ☆☆☆
Visually non-intimidating ☆☆☆	Visually non-intimidating ☆☆☆	Visually non-intimidating ☆☆☆	Visually non-intimidating ☆☆☆	Visually non-intimidating ☆☆☆
Softness ☆	Softness ☆☆☆	Softness ☆☆☆	Softness ☆☆☆	Softness ☆☆☆
Intuitiveness ☆☆☆	Intuitiveness ☆☆☆	Intuitiveness ☆☆☆	Intuitiveness ☆☆☆	Intuitiveness ☆☆☆
Durability ☆☆☆	Durability ☆☆☆	Durability ☆☆☆	Durability ☆☆☆	Durability ☆☆☆
Packability/storability ☆☆☆	Packability/storability ☆☆☆	Packability/storability ☆☆☆	Packability/storability ☆☆☆	Packability/storability ☆☆☆
Required Manpower ☆☆☆	Required Manpower ☆☆☆	Required Manpower ☆☆☆	Required Manpower ☆☆☆	Required Manpower ☆☆☆
Manipulatability ☆☆☆	Manipulatability ☆☆☆	Manipulatability ☆☆☆	Manipulatability ☆☆☆	Manipulatability ☆☆☆
Rapid deployment ☆☆☆	Rapid deployment ☆☆☆	Rapid deployment ☆☆☆	Rapid deployment ☆☆☆	Rapid deployment ☆☆☆
Lightweight ☆☆☆	Lightweight ☆☆☆	Lightweight ☆☆☆	Lightweight ☆☆☆	Lightweight ☆☆☆



Various folding mechanisms and functionalities were investigated and gathered to guide ongoing product development. While some didn't effectively serve the primary purpose of a stair chair, their folding techniques were considered for potential integration into the stair chair design.



SCENARIO OF USE

While brainstorming the “Who, What, Where, When, Why, How” surrounding the stair chair concept, logistical factors were taken into consideration, such as; Who is the intended audience? When would these devices be used? How are the devices stored? How many will be stored in one place? Where are they stored? How will people know where they are stored? How are they carried?

Who will use them?

- Primary Responders
- Students
- Teachers
- Employees
- First Responders
- Police
- EMS
- Firefighters

How are they stored?



Fully collapsible



Partially collapsible

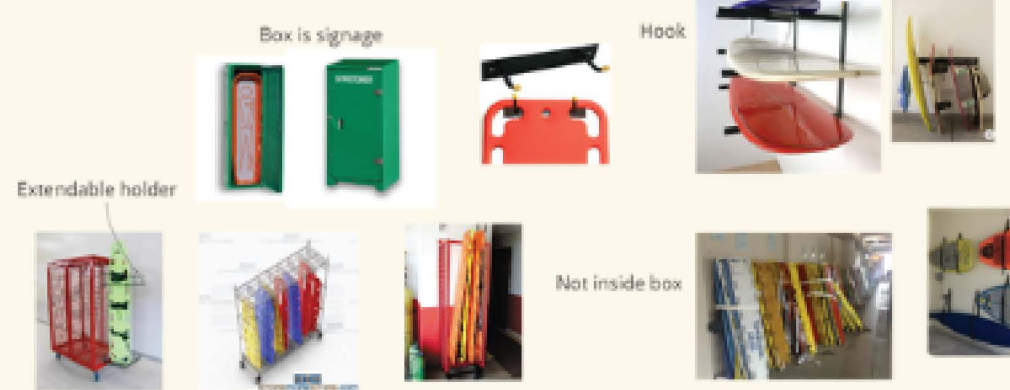
How will people carry it?



Where will these be placed?

- By entrance?
- By stairs?
- By existing first aid equipment?
- By security?

How will people know where they are?



How many will be placed in each spot?

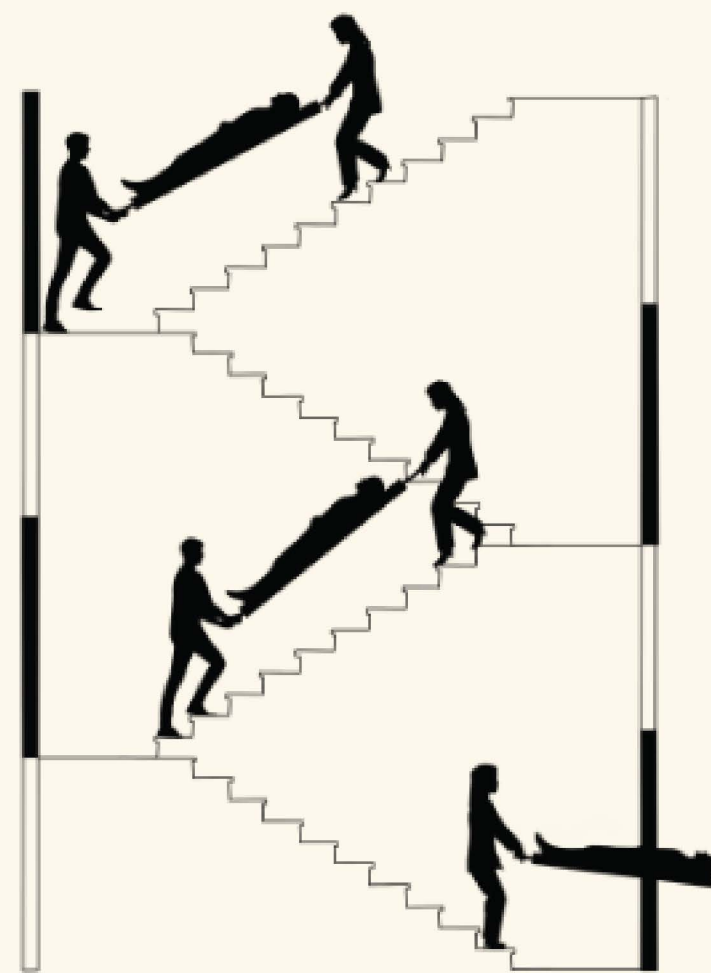
Single Placed — one per floor? — One per room?



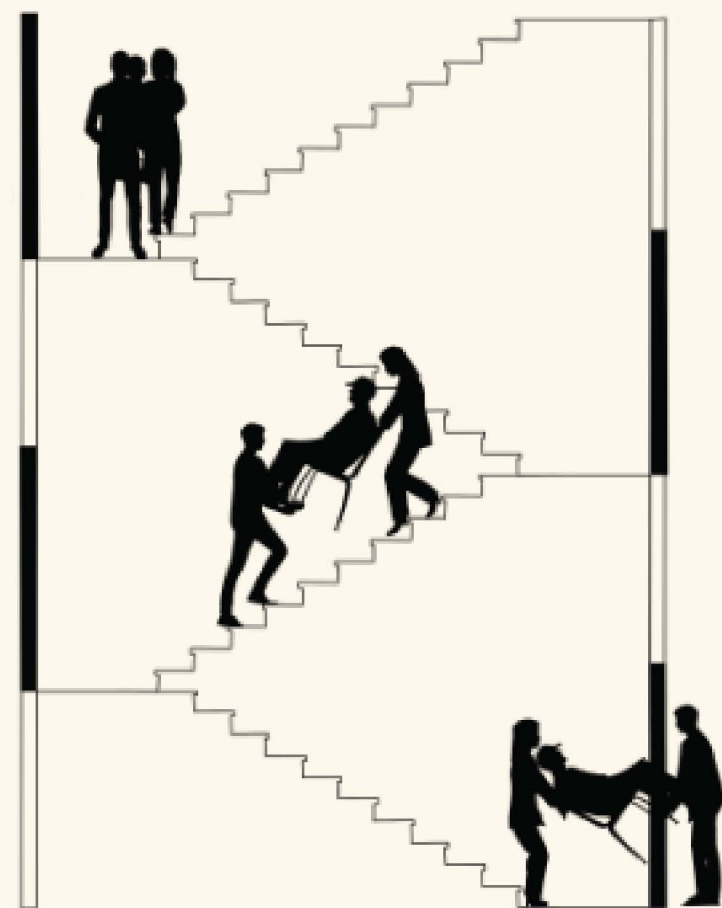
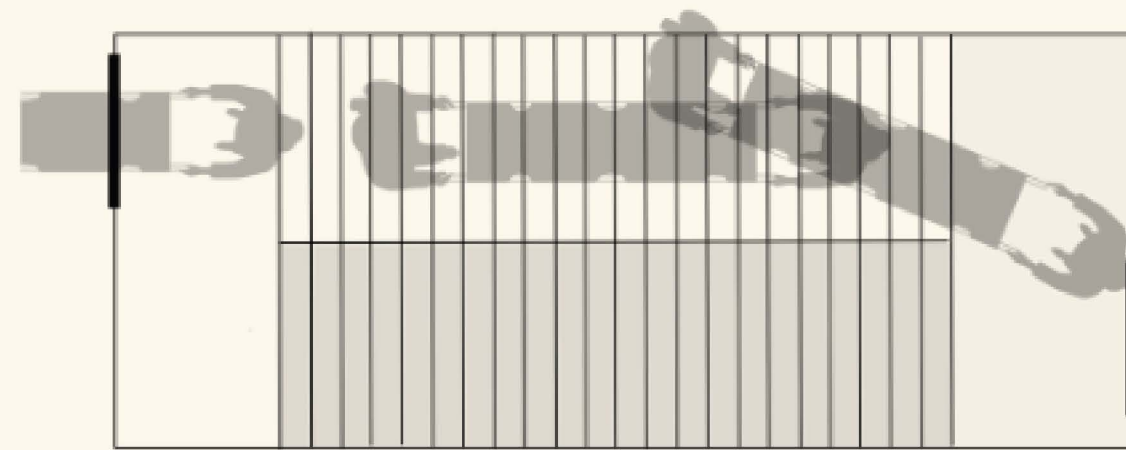
- Box is signage
- Hook
- Extendable holder
- Not inside box
- movable rack (for large quantities)

miro

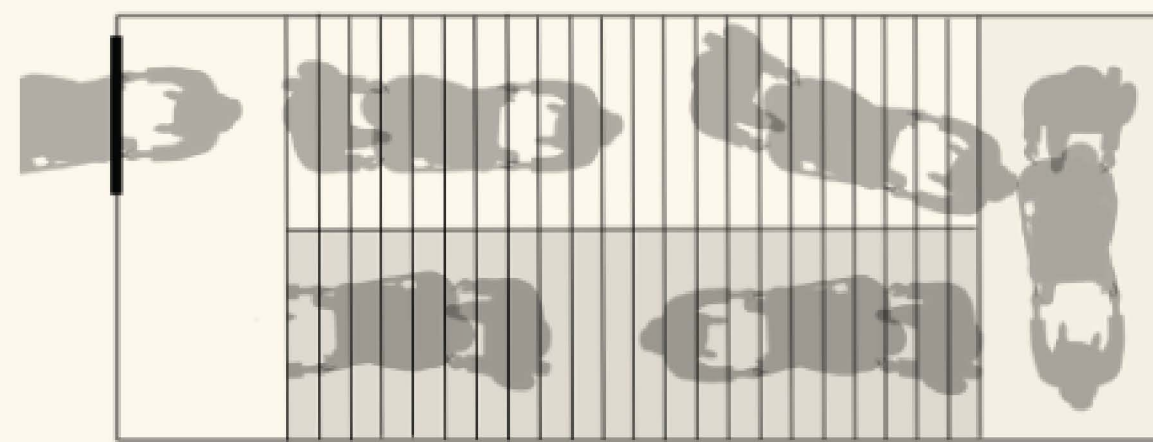




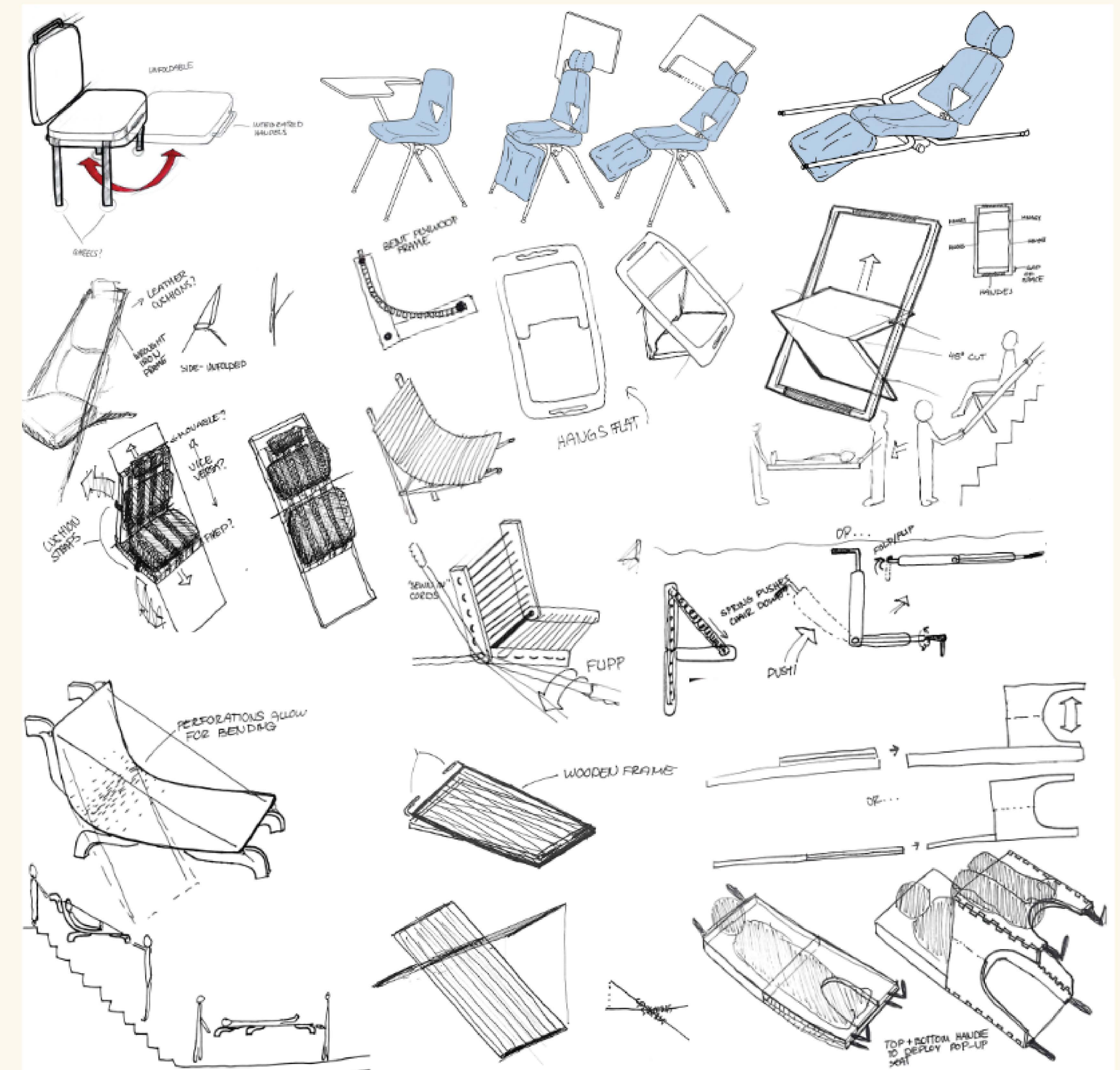
Traditional stretchers have trouble navigating tight corners or turns due to its large footprint. Additionally, the weight tends to be distributed towards the lower rescuer.



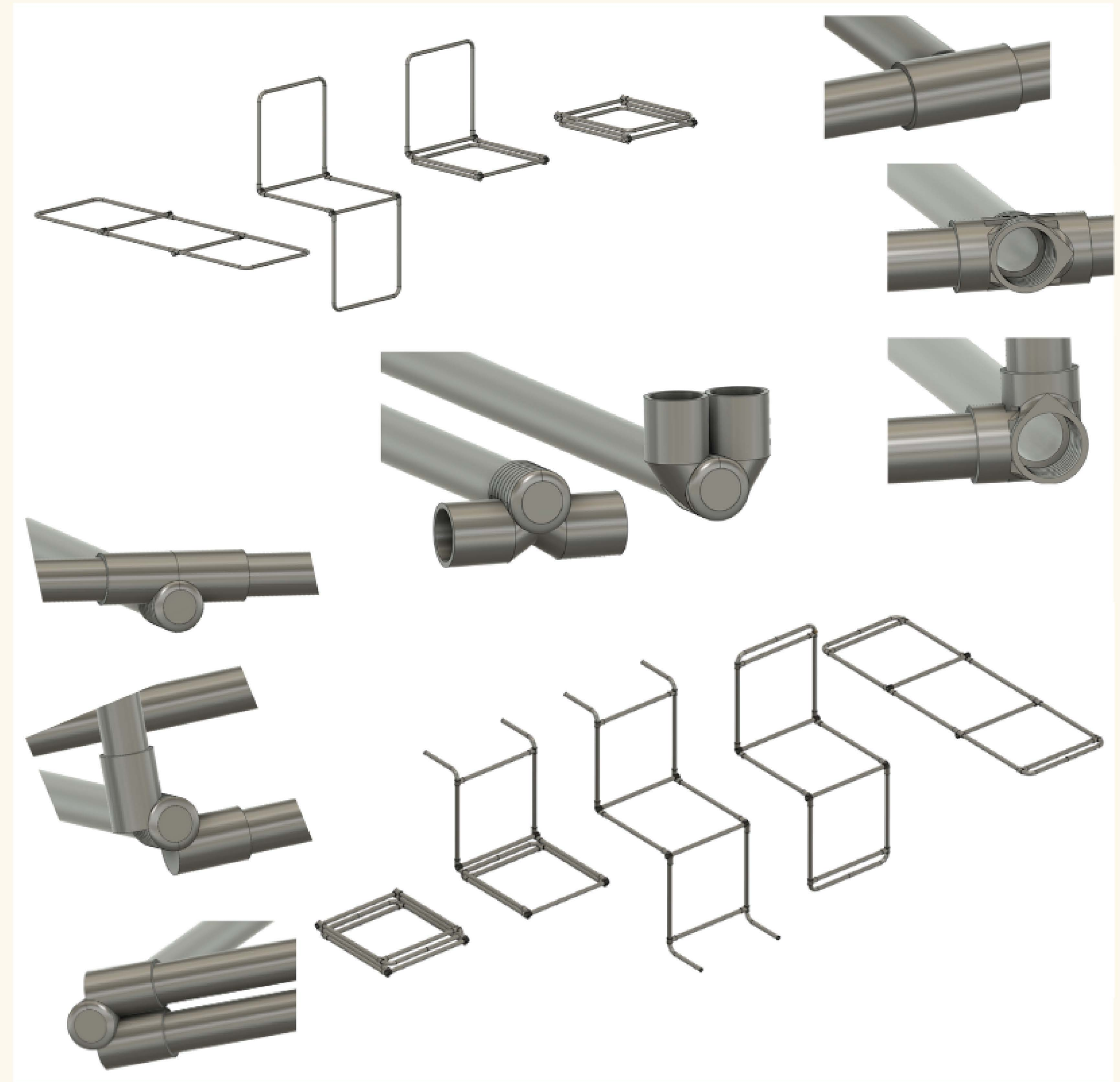
Stair chairs are able to navigate these tight corners due to a smaller footprint, and evenly distributes weight between the rescuers when carried over changing inclinations.



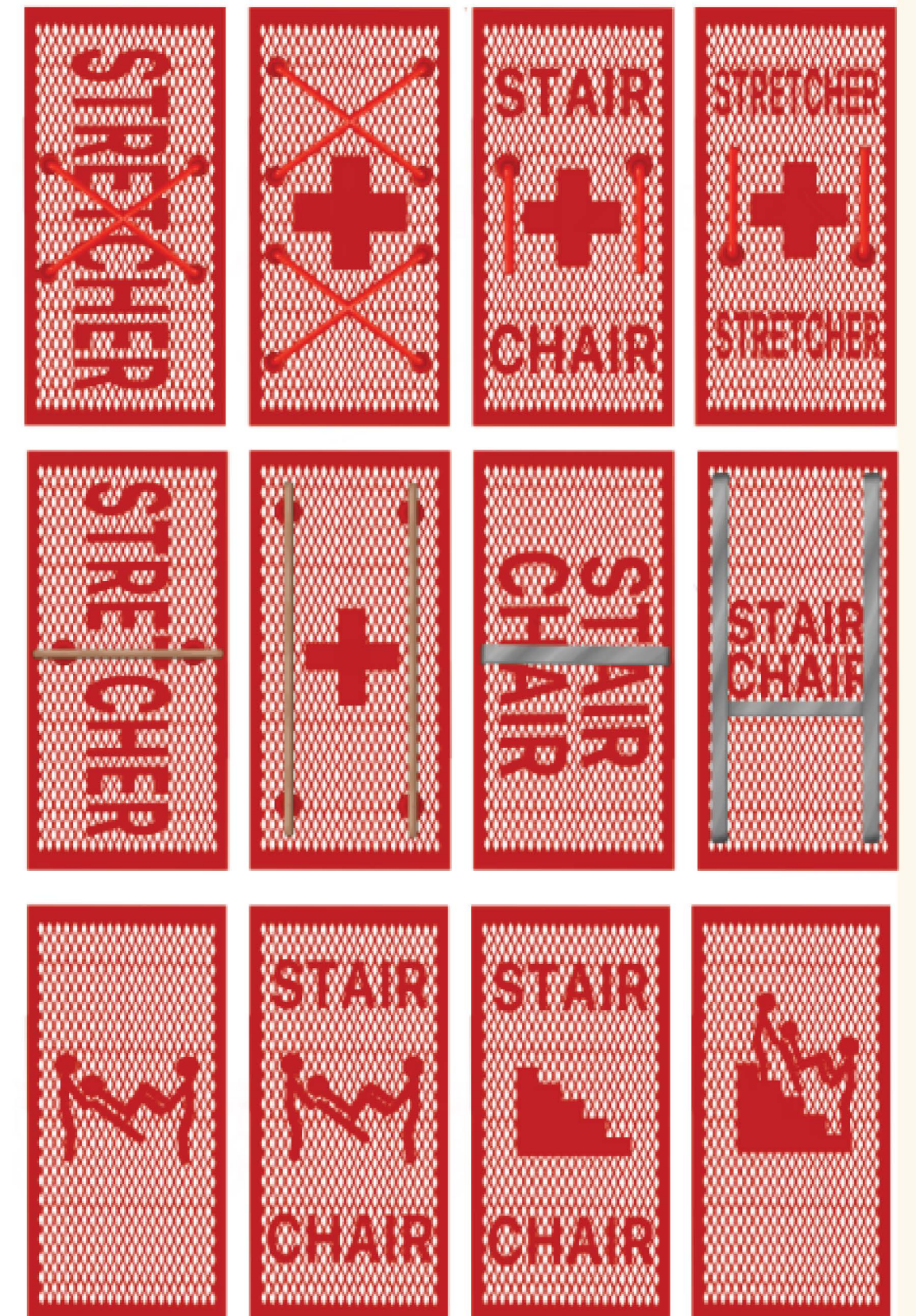
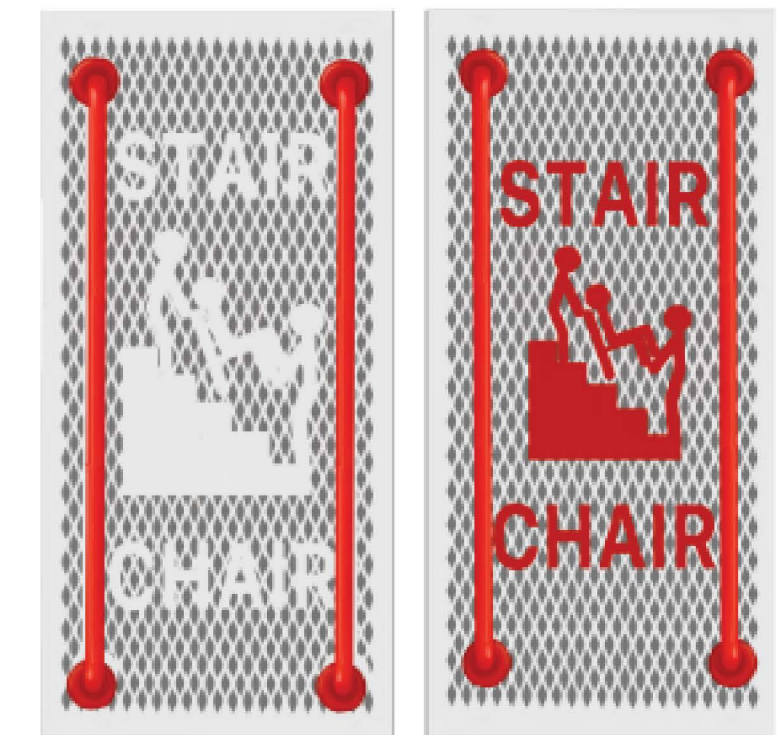
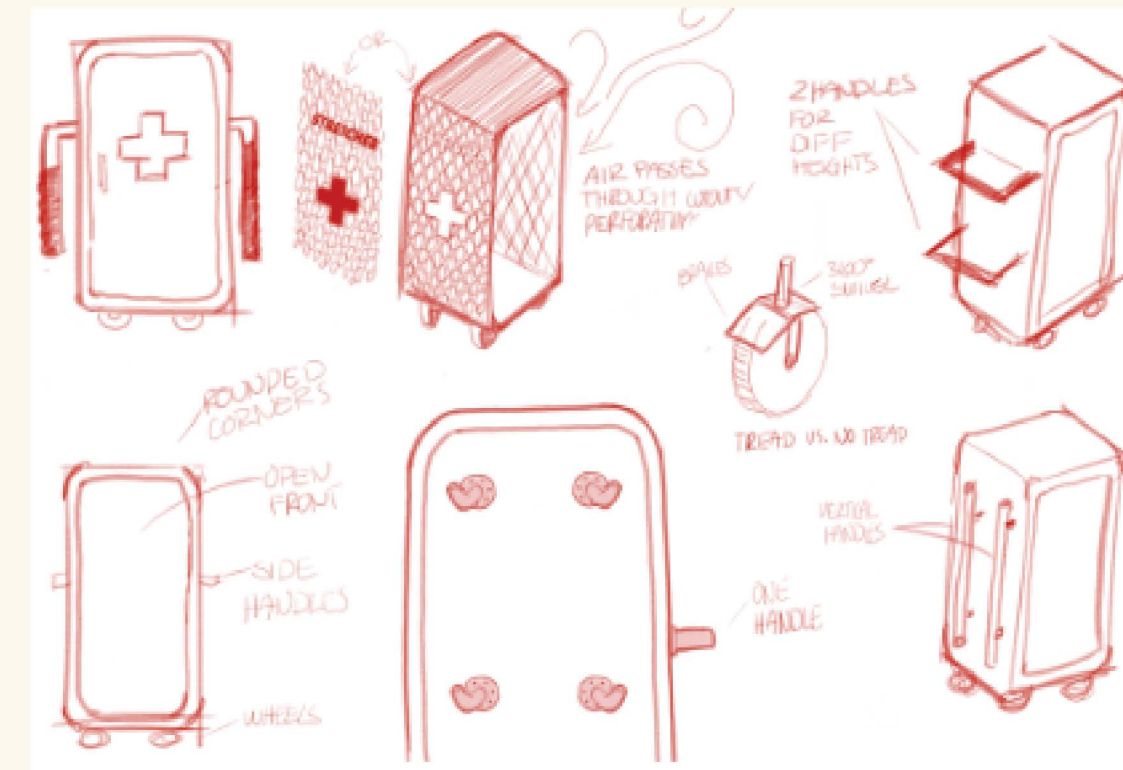
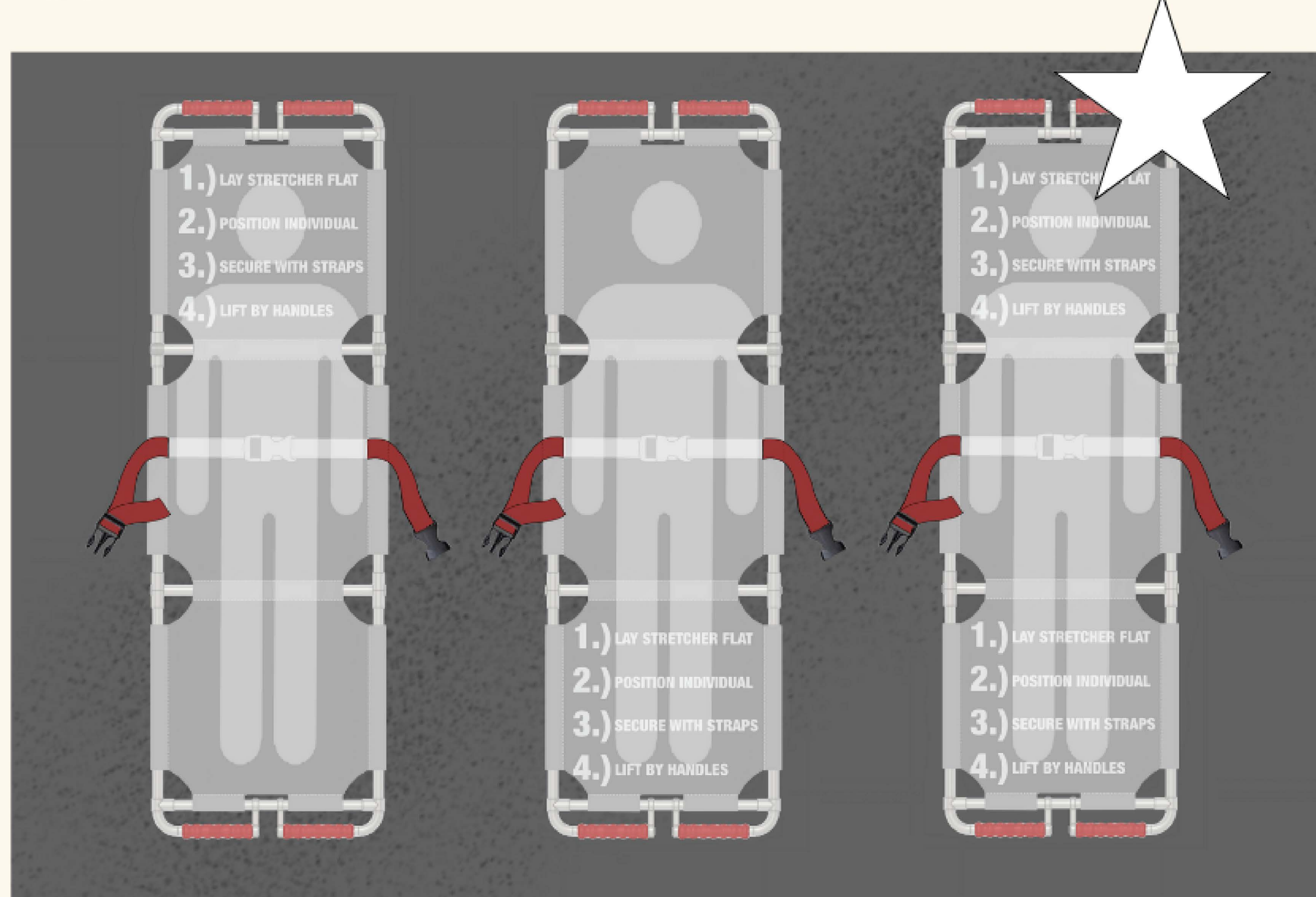
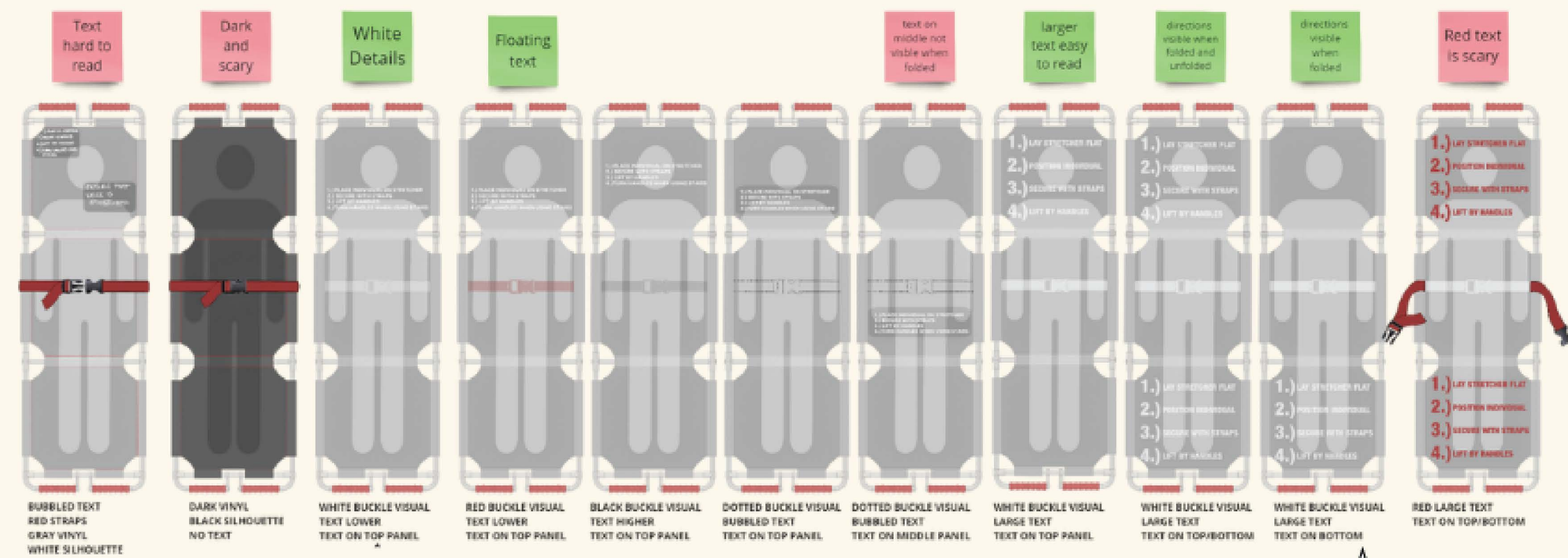
## FORM REFINEMENT







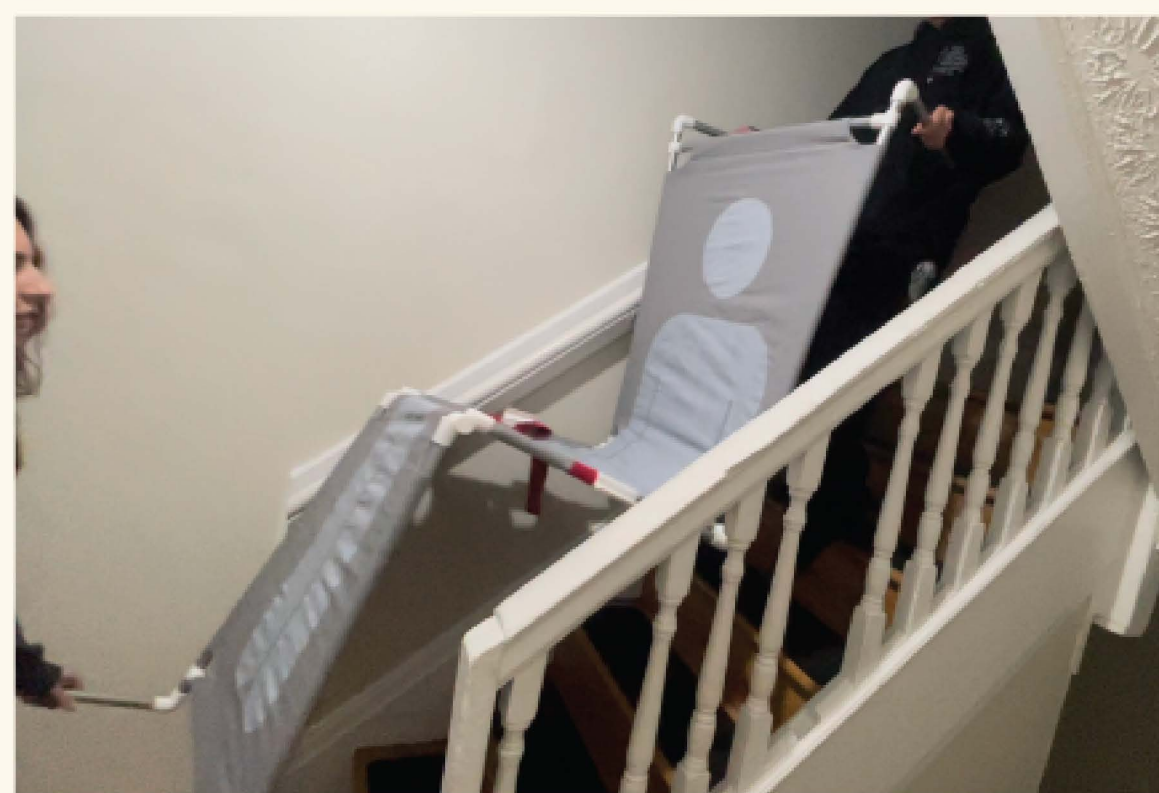








APPEARANCE MODEL

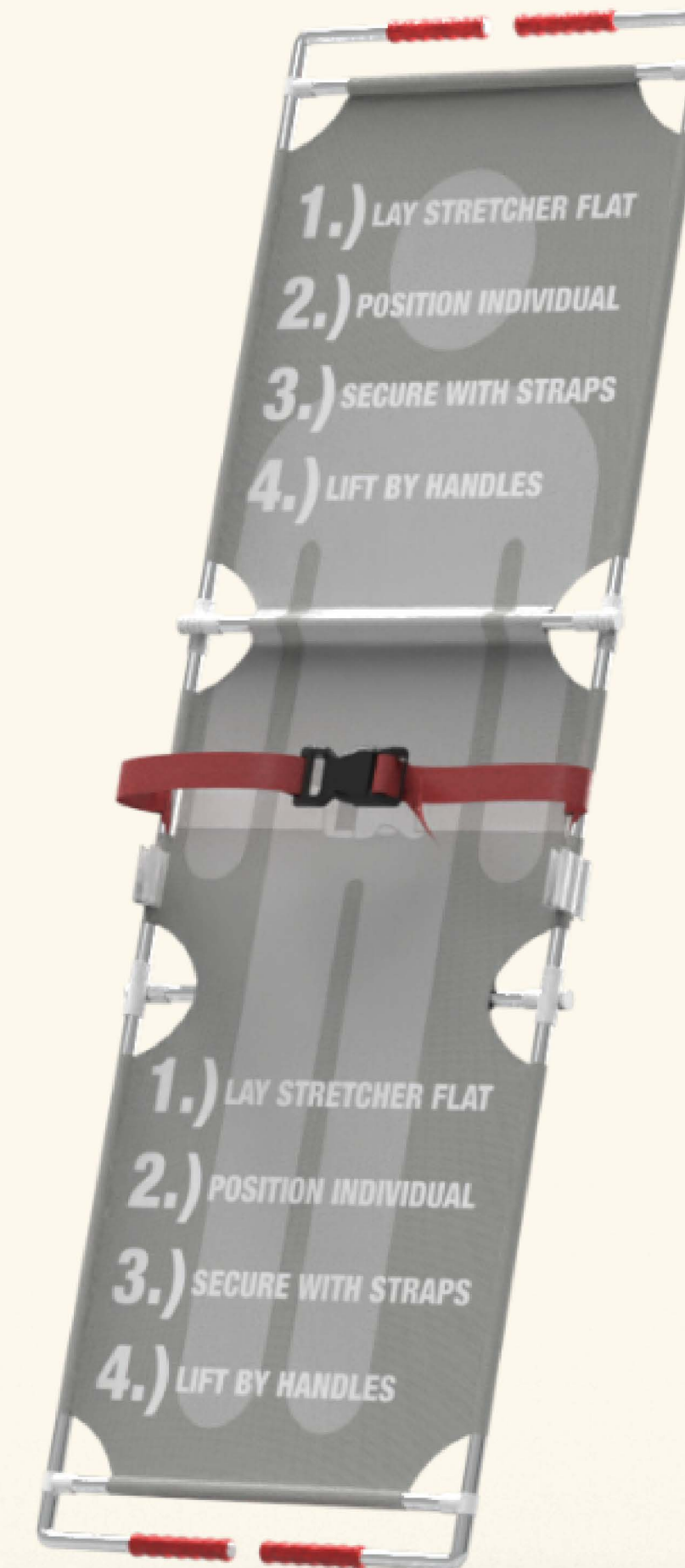


CONCEPT INTRODUCTION

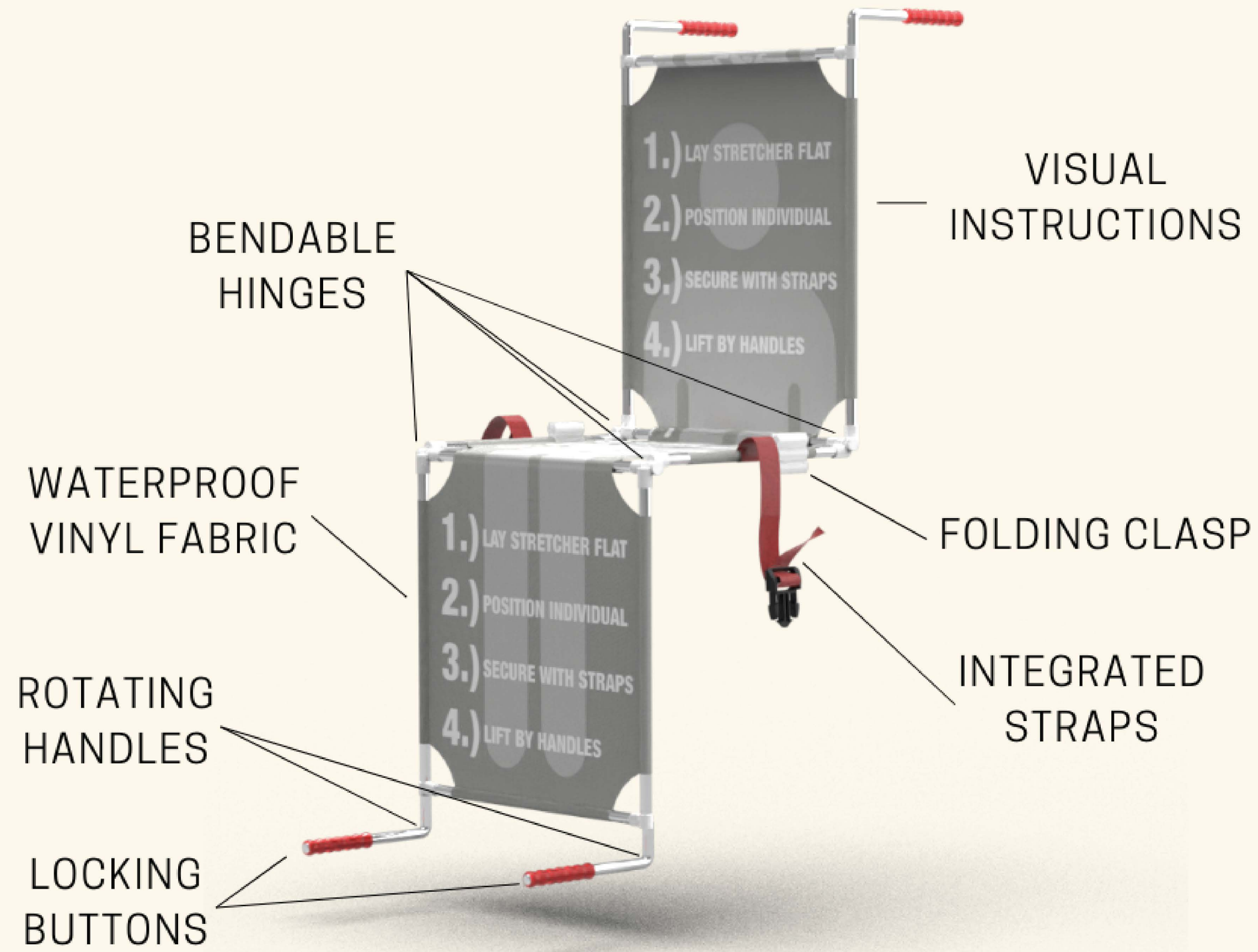


A public-facing emergency evacuation stairwell stretcher for movement impaired individuals

The StairSafe mission aims to offer cost-effective equipment that is easily available for use in all public facilities. With the StairSafe system, bystanders feel empowered to respond in the event of a Mass Casualty Incident (MCI) with confidence.



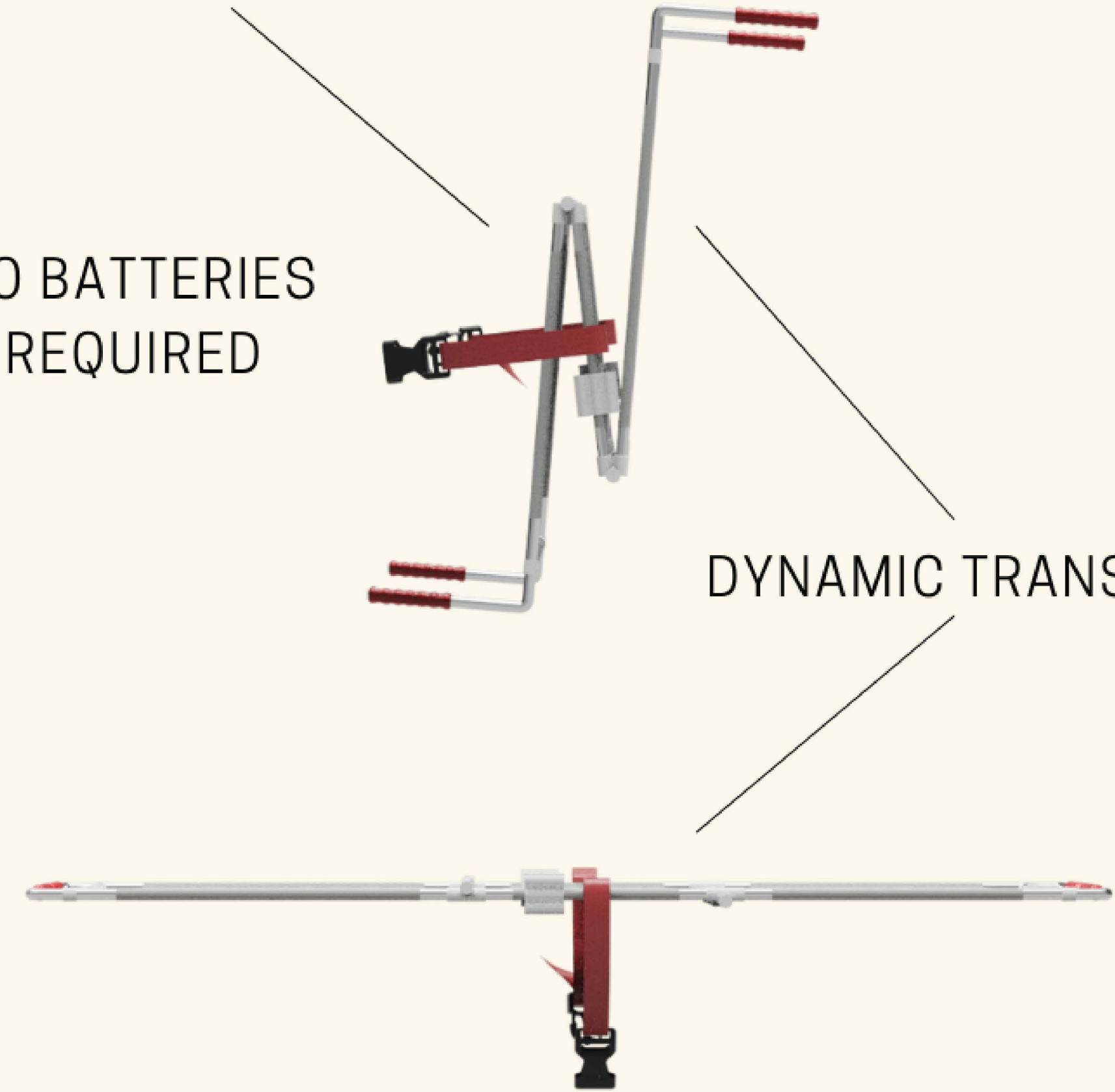




LIGHTWEIGHT FRAME

NO BATTERIES  
REQUIRED

DYNAMIC TRANSITION







StairSafe wall hooks can be used to mount up to four StairSafe Stretcher devices on a wall. These hooks can be installed in various configurations to meet the needs of a given business or organization.



Wall hooks can be integrated into the StairSafe rolling cart to allow for the transport of multiple stretchers at a time, and conceals the devices when not in use. Signage on the cart sides allows for bystanders to easily locate the system from either side of the cart.





