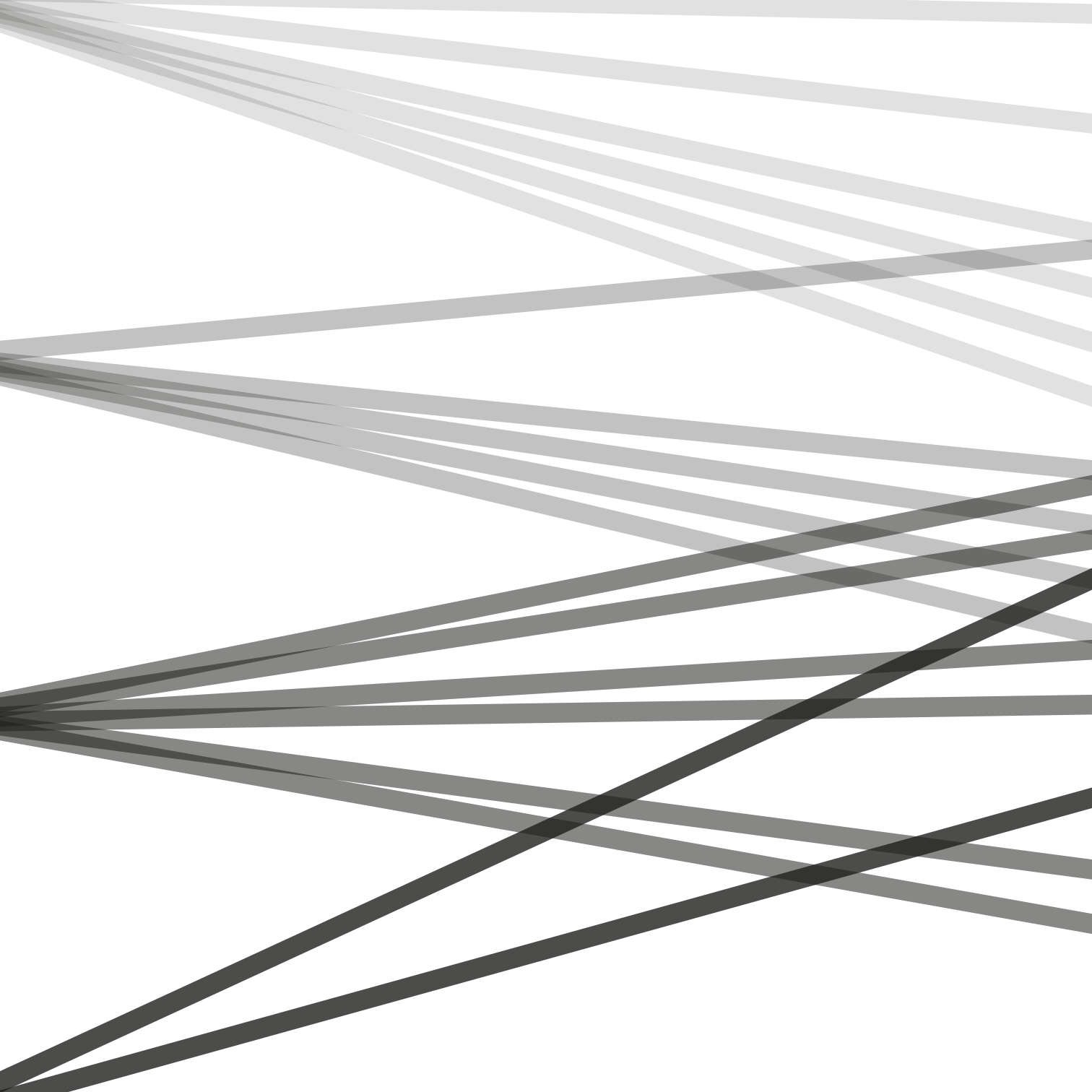
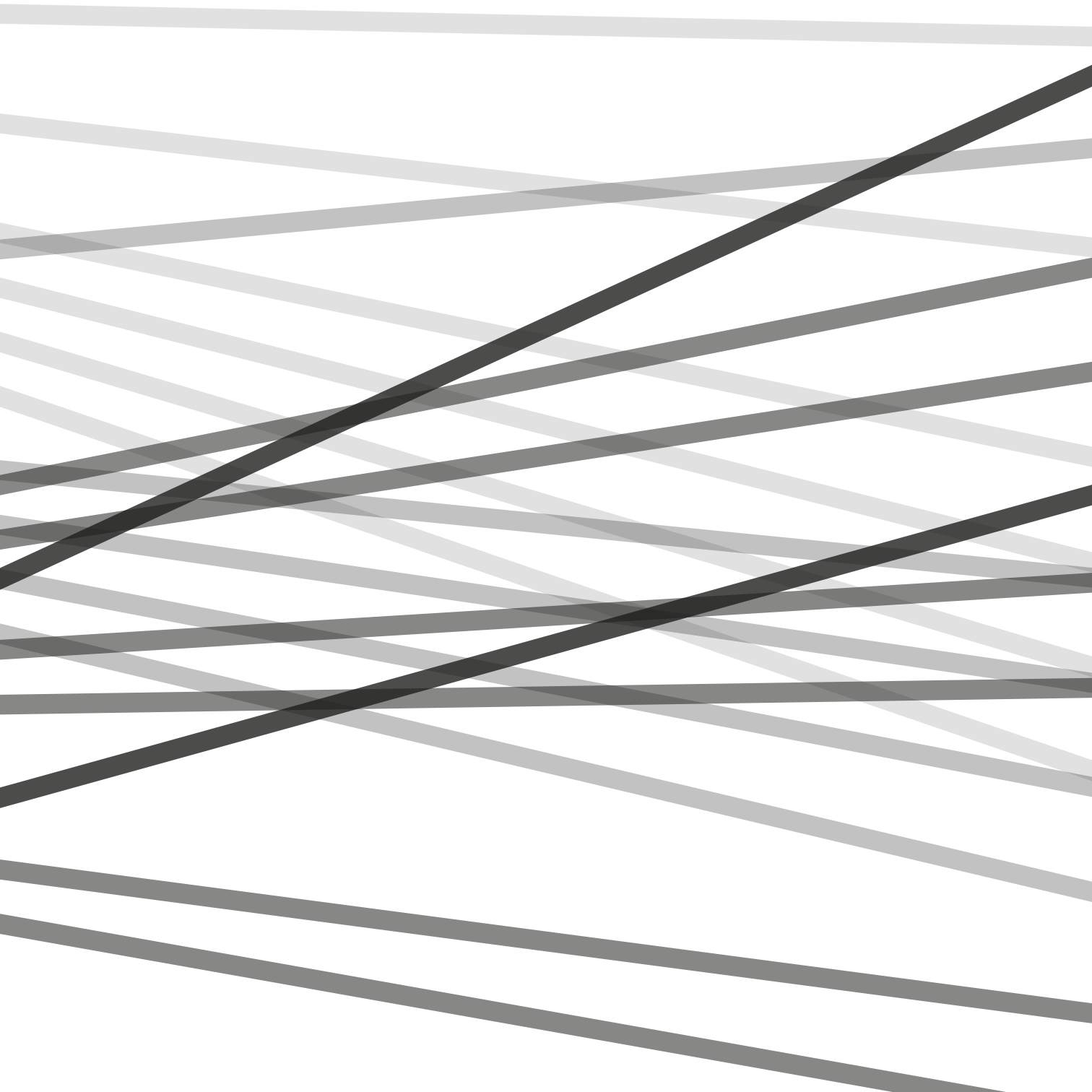


# *LIFEHOUSE*

EARTHQUAKE SURVIVAL KIT

Degree project for Bachelor of Fine Arts in Design  
**HARALD SUNDBERG & JOHAN KRANTZ**







**LUND**  
UNIVERSITY



## **LIFEHOUSE**

Harald Sundberg and Johan Krantz

## **DEGREE PROJECT FOR**

Bachelor of Fine Arts in Design

Main field of study, Industrial Design

## **DEPARTMENT**

Design Sciences

School of Industrial Design

Lund University

## **EXAMINER**

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## **ISRN-NUMBER**

LUT-DVIDE/ EX--16/50336—SE

**2016**

# ***ABSTRACT***

I det här projektet tar vi oss an problematiken kring tvångsförflyttning vid jordbävningar. Vårt fokus är på individen och vilka förebyggande åtgärder denne kan vidta för att lindra trycket på hjälporganisationer vid katastrofer. Målet med projektet är att undersöka vad som kan göras för naturkatastroffer och om det kan underlätta hjälparbetet samt öka medvetenheten om risk. Vi undersöker detta genom att utveckla ett beredskapskit för hemmiljön. En färdigpackad ryggsäck som snabbt kan tas med vid en katastrof och som fungerar som ett temporärt hem.

# ***ABSTRACT***

In this project we tackle the problem with forced displacement as a consequence of earthquakes. Our focus is to enable individuals to take preparedness measures that mitigates the need for external aid in disastrous events. The project aims to investigate if something more could be done for victims of disaster and to relief rescue work as well as raising awareness of risk. This is done through development of a preparedness kit for the home environment. A grab and run backpack that can act as a temporary home if a disaster strikes.



# ***ACKNOWLEDGEMENTS***

We are thankful for the opportunity, made possible by the school of industrial design and it's fantastic staff, to realise this project. It would have been hard without the feedback and support given by Claus-Christian Eckhardt and Nadja Maya as well as input from the other supervisors.

We would like to thank Julien de Smedt and Makers With Agendas for allowing us to work with this project. As well as their valuable critique and comments along the development of the project.

Finally we would like to thank the fellow students in the school that have shown interest and support. Especially thankful are we for the support and feedback from Pontus Edman and David Bursell who have been with us from the start of the project.

## **JOHAN KRANTZ**

The aim was to try take on a more complex project with many aspects to test my skills. To know from the beginning that all the different needs in displacement situations are not one solution and take it on from the angle of an industrial designer. The decision to work in a pair and with external input was to push the project further. Also to challenge each other throughout and making decision based on discussions and evaluations.

## **HARALD SUNDBERG**

My goals with this project was to try the set of skills that I have developed during the bachelors programme in industrial design. I also thought it an opportunity to produce a high quality model while I still have the possibilities of using workshops and workshop staff expertise. I imagined that this project would be a complicated product that had many components and would need lots of research, model making and testing.



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INTRODUCTION

---

COLLABORATION

# ***MAKERS WITH AGENDAS***

MWA stands for Makers With Agendas and is a design studio based in Copenhagen. Founded in 2013 by Julien de Smedt and William Ravn the trio is complete with partner Wouter Dons. They address matters of society by creating meaningful products, which they refer to as agenda-driven design. MWA is engaged in thinking, producing and distributing design. They operate across scales and disciplines from two divisions:

The MWA product division, where their designs materialise and the MWA project division where they think, perform and implement their agenda-driven design principles outside the boundaries of our product division.

The idea and brief of the project was initiated by MWA.

---

<http://mwa.eu/>

# *HUMAN DISPLACEMENT*

Imagine a single aid kit always available in the form of a backpack. A bag that you can grab while rushing out in case of an emergency. More and more regions of our planet are becoming subjects to recurring natural disasters that will increasingly put a burden on society and aid organisations. Life-house will contain all the required first aid for 3 days of forced displacement.





FIRST MEEETING WITH SUPERVISORS



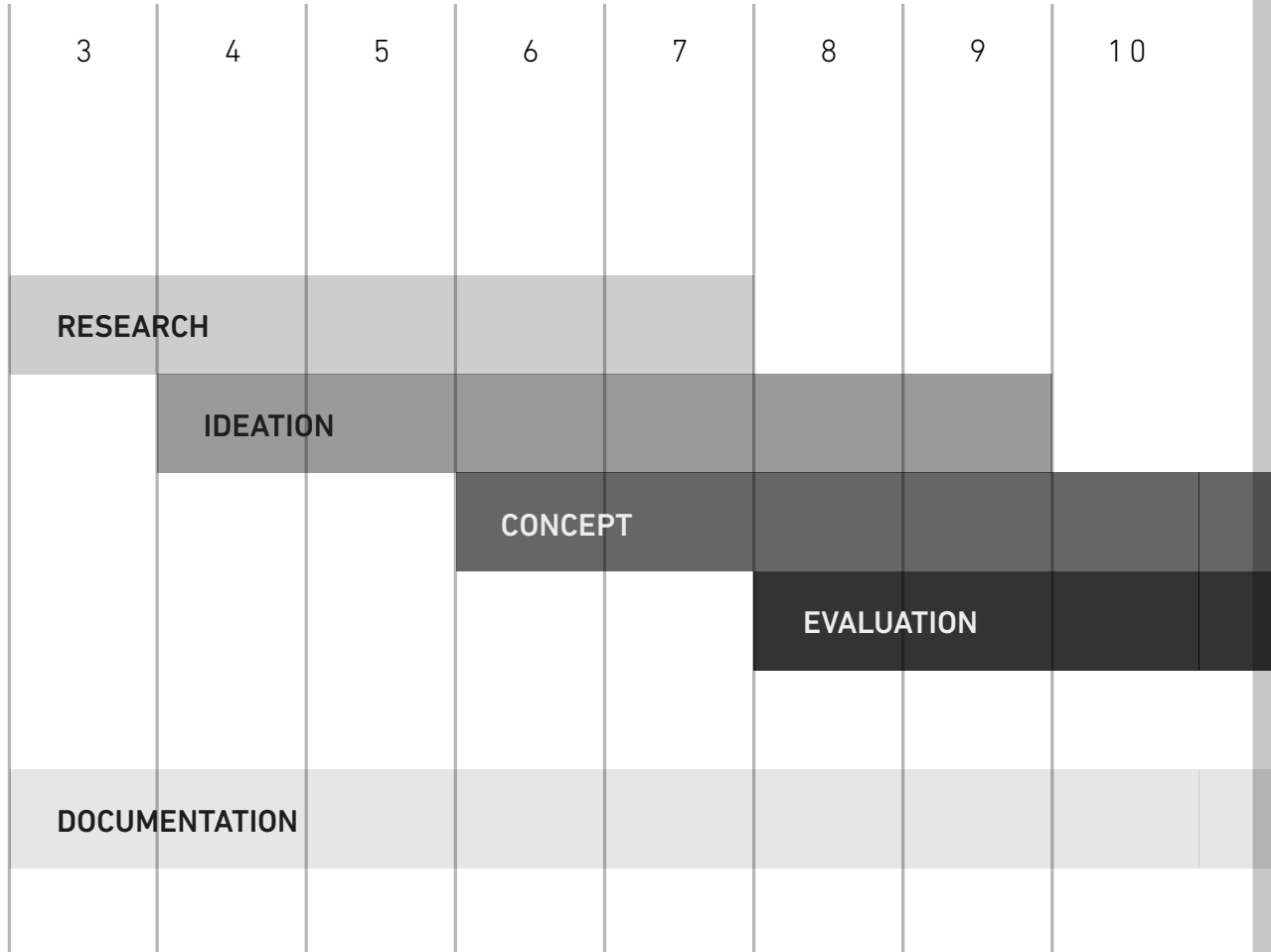
RESEARCH PRESENTATION



KICK-OFF PRESENTATION

INTRODUCTION

SCHEDULE



FIRST MEETING



RESEARCH PRESENTATION



CONCEPT PRESENTATION



INDIVIDUAL  
CRITIQUE 1



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**REALISATION**



EVALUATION  
MWA OFFICE

# *HOW WE WORK*

The project has been anchored in research and through evaluation we have generated ideas in response to the problems we have identified. Constant evaluation and iteration of ideas have been our way of finding solutions we believe in and our guarantee that as little as possible is overlooked.

Evaluation is done by criteria formulated to fit the brief and with respect to time and ability of pursuing an idea. Our goal was to take as many aspects into consideration as possible to try to understand the complexity of disaster aid.

Brainstorming have been a useful tool when generating ideas and building mock-ups have helped us develop the ideas and understand them better. Mock-ups have in that sense served as means to evaluate ideas.

Conversation and discussion between us have been key in making good decisions that both can stand for. It has served as the main platform of evaluation and generation of new ideas. It has been important to ventilate and build common goals to understand each other but also to further the result.





# *RESEARCH*

It was necessary to form a general idea and understanding of disaster and displacement. We started with reading up on organisations that deal with the problems of disaster and forced displacement. The image that was gradually painted of the problem just kept growing and over time revealed a complex picture. To grasp the information better we mapped out our research data in clusters of common denominators.







## TERMINOLOGY

A natural disaster terminology developed by UNISDR with definitions to promote understanding on the subject. Also a list of organisations that will appear only with their logos or abbreviations in the documentation.

---

<https://www.unisdr.org/we/inform/terminology>



EMBASSY OF UNITED STATES TURKEY



FEDERAL EMERGENCY MANAGEMENT AGENCY, FEMA



IKEA FOUNDATION



INTERNATIONAL COMMITTEE OF THE RED CROSS

ICRC



INTERNATIONAL FEDERATION OF RED CROSS, IFRC



TURKISH RED CRESCENT



THE OFFICE OF THE UNITED NATIONS  
HIGH COMMISSIONER FOR REFUGEES, UNHCR



THE UNITED NATIONS OFFICE  
FOR DISASTER RISK REDUCTION



THE UNITED NATIONS



REPUBLIC OF TURKEY PRIME MINISTRY  
DISASTER & EMERGENCY MANAGEMENT AUTHORITY

### ACCEPTABLE RISK

The level of potential losses that a society or community considers acceptable given existing social, economic, political, cultural, technical and environmental conditions.

### ADAPTATION

The adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.

### BIOLOGICAL HAZARD

Process or phenomenon of organic origin or conveyed by biological vectors, including exposure to pathogenic micro-organisms, toxins and bioactive substances that may cause loss of life, injury, illness or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.

### BUILDING CODE

A set of ordinances or regulations and associated standards intended to control aspects of the design, construction, materials, alteration and occupancy of structures that are necessary to ensure human safety and welfare, including resistance to collapse and damage.

### CAPACITY

The combination of all the strengths, attributes and resources available within a community, society or organization that can be used to achieve agreed goals.

### CAPACITY DEVELOPMENT

The process by which people, organizations and society systematically stimulate and develop their capacities over time to achieve social and economic goals, including through improvement of knowledge, skills, systems, and institutions.

### CONTINGENCY PLANNING

A management process that analyses specific potential events or emerging situations that might threaten society or the environment and establishes arrangements in advance to enable timely, effective and appropriate responses to such events and situations.

### COPING CAPACITY

The ability of people, organizations and systems, using available skills and resources, to face and manage adverse conditions, emergencies or disasters.

### CORRECTIVE DISASTER RISK MANAGEMENT

Management activities that address and seek to correct or reduce disaster risks which are already present.

### CRITICAL FACILITIES

The primary physical structures, technical facilities and systems which are socially, economically or operationally essential to the functioning of a society or community, both in routine circumstances and in the extreme circumstances of an emergency.

### DISASTER

A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources.

### DISASTER RISK

The potential disaster losses, in lives, health status, livelihoods, assets and services, which could occur to a particular community or a society over some specified future time period.

### DISASTER RISK MANAGEMENT

The systematic process of using administrative directives, organizations, and operational skills and capacities to implement strategies, policies and improved coping capacities in order to lessen the adverse impacts of hazards and the possibility of disaster.

### DISASTER RISK REDUCTION

The concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events.



## DISASTER RISK REDUCTION PLAN

A document prepared by an authority, sector, organization or enterprise that sets out goals and specific objectives for reducing disaster risks together with related actions to accomplish these objectives.

## EARLY WARNING SYSTEM

The set of capacities needed to generate and disseminate timely and meaningful warning information to enable individuals, communities and organizations threatened by a hazard to prepare and to act appropriately and in sufficient time to reduce the possibility of harm or loss.

## EMERGENCY MANAGEMENT

The organization and management of resources and responsibilities for addressing all aspects of emergencies, in particular preparedness, response and initial recovery steps.

## EMERGENCY SERVICES

The set of specialized agencies that have specific responsibilities and objectives in serving and protecting people and property in emergency situations.

## ENVIRONMENTAL IMPACT ASSESSMENT

Process by which the environmental consequences of a proposed project or programme are evaluated, undertaken as an integral part of planning and decision-making processes with a view to limiting or reducing the adverse impacts of the project or programme.

## EXPOSURE

People, property, systems, or other elements present in hazard zones that are thereby subject to potential losses.

## EXTENSIVE RISK

The widespread risk associated with the exposure of dispersed populations to repeated or persistent hazard conditions of low or moderate intensity, often of a highly localized nature, which can lead to debilitating cumulative disaster impacts.

## GEOLOGICAL HAZARD

Geological phenomenon that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.

## HAZARD

A dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.

## INTENSIVE RISK

The risk associated with the exposure of large concentrations of people and economic activities to intense hazard events, which can lead to potentially catastrophic disaster impacts involving high mortality and asset loss.

## LAND-USE PLANNING

The process undertaken by public authorities to identify, evaluate and decide on different options for the use of land, including consideration of long term economic, social and environmental objectives and the implications for different communities and interest groups.



## MITIGATION

The lessening or limitation of the adverse impacts of hazards and related disasters.

## NATIONAL PLATFORM FOR DISASTER RISK REDUCTION

A generic term for national mechanisms for coordination and policy guidance on disaster risk reduction that are multi-sectoral and inter-disciplinary in nature, with public, private and civil society participation involving all concerned entities within a country.

## PREVENTION

The outright avoidance of adverse impacts of hazards and related disasters.

## PERSPECTIVE DISASTER RISK MANAGEMENT

Management activities that address and seek to avoid the development of new or increased disaster risks.



## PREPAREDNESS

The knowledge and capacities developed by governments, professional response and recovery organizations, communities and individuals to effectively anticipate, respond to, and recover from, the impacts of likely, imminent or current hazard events or conditions.

## PUBLIC AWARENESS

The extent of common knowledge about disaster risks, the factors that lead to disasters and the actions that can be taken individually and collectively to reduce exposure and vulnerability to hazards.

## RECOVERY

The restoration, and improvement where appropriate, of facilities, livelihoods and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors.

## RESIDUAL RISK

The risk that remains in unmanaged form, even when effective disaster risk reduction measures are in place, and for which emergency response and recovery capacities must be maintained.

## RESILIENCE

The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions

## RESPONSE

The provision of emergency services and public assistance during or immediately after a disaster in order to save lives, reduce health impacts, ensure public safety and meet the basic subsistence needs of the people affected.

## RETROFITTING

Reinforcement or upgrading of existing structures to become more resistant and resilient to the damaging effects of hazards.

## RISK

The combination of the probability of an event and its negative consequences. The word "risk" has two distinctive connotations: in popular usage the emphasis is placed on the concept of chance or possibility, such as in "the risk of an accident"; whereas in technical settings the emphasis is usually placed on the consequences, in terms of "potential losses" for some particular cause, place and period.

## RISK MANAGEMENT

The systematic approach and practice of managing uncertainty to minimize potential harm and loss.

## RISK TRANSFER

The process of formally or informally shifting the financial consequences of particular risks from one party to another whereby a household, community, enterprise or state authority will obtain resources from the other party after a disaster occurs, in exchange for ongoing or compensatory social or financial benefits provided to that other party.

## RISK ASSESSMENT

A methodology to determine the nature and extent of risk by analysing potential hazards and evaluating existing conditions of vulnerability that together could potentially harm exposed people, property, services, livelihoods and the environment on which they depend.

## STRUCTURAL MEASURES

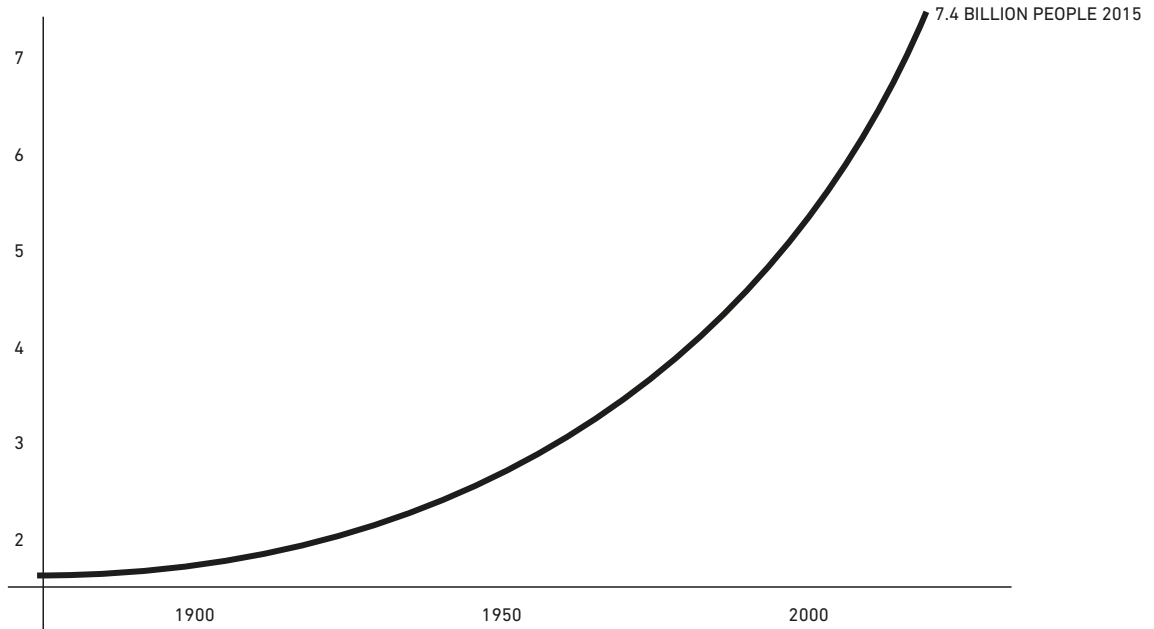
Any physical construction to reduce or avoid possible impacts of hazards, or application of engineering techniques to achieve hazard-resistance and resilience in structures or systems

## NON-STRUCTURAL MEASURES

Any measure not involving physical construction that uses knowledge, practice or agreement to reduce risks and impacts, in particular through policies and laws, public awareness raising, training and education.

## VULNERABILITY

The characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard.



## BACKGROUND

In 2014 more than 88 million, almost the population of Germany, people were displaced worldwide due to armed conflicts or natural disasters. As the world's population grows more, people become vulnerable to the risk of being displaced. Typically it is the developing world that suffers the most from hazards such as severe weather. There are many hazards that turn into disasters, we have chosen to divide these into two categories, man-made and natural disasters. This helps us structure our research to make it easier to understand. A disaster occurs when a hazard impacts on vulnerable people.

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UNISDR. the human cost of weather related disasters 1995–2015. Cop21 Paris 2015

<http://www.internal-displacement.org/assets/publications/2014/201409-global-estimates2.pdf>

## HUMAN DISPLACEMENT

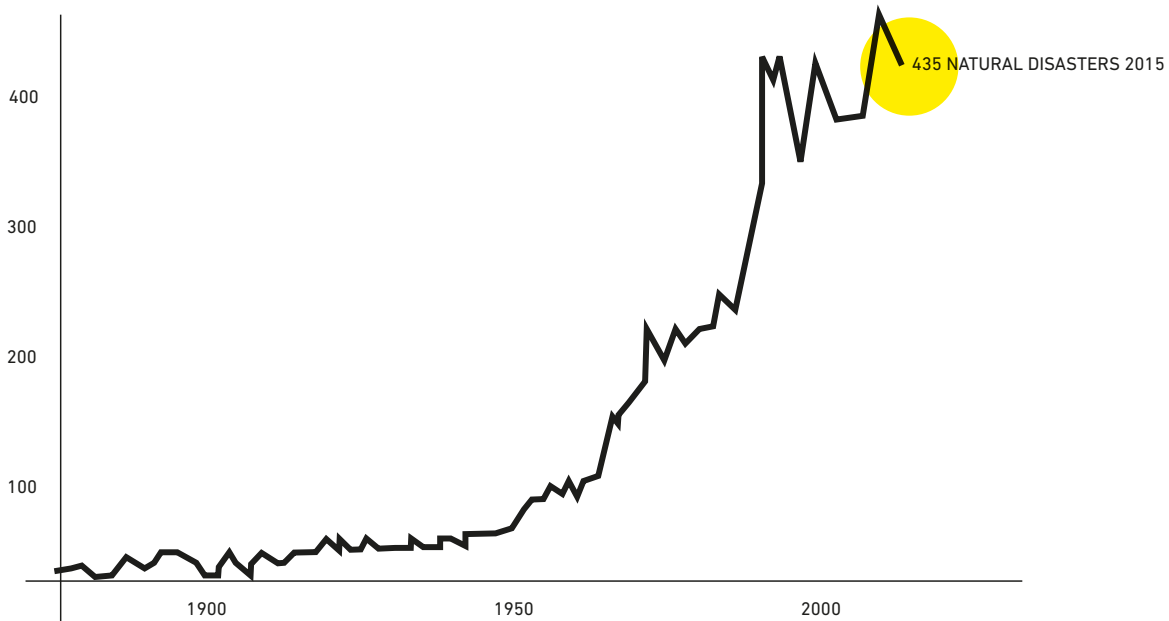
Displaced defines as moved or put out of the usual or proper place. When people are forced to leave their homes or place of habitual residence.

---

<http://www.unesco.org/new/en/social-and-human-sciences/themes/international-migration/glossary/displaced-person-displacement/>

<http://www.unhcr.org/558193896.html>





## NATURAL HAZARD

Natural hazards are defined by the Red Cross as naturally occurring physical phenomena caused either by rapid or slow onset events which can be geophysical (earthquakes, landslides, tsunamis and volcanic activity), hydrological (avalanches and floods), climatological (extreme temperatures, drought and wildfires), meteorological (cyclones and storms/wave surges) or biological (disease epidemics and insect/animal plagues).

<http://www.ifrc.org/en/what-we-do/disaster-management/about-disasters/definition-of-hazard/>

## MAN-MADE HAZARD

Man-made hazards are defined by the Red Cross as events that are caused by humans and occur in or close to human settlements. This can include environmental degradation, pollution, accidents and armed conflict.

<http://www.ifrc.org/en/what-we-do/disaster-management/about-disasters/definition-of-hazard/>

## ENVIRONMENTAL

Release of greenhouse gasses raises temperature, water levels and causes more severe weather. This generates long term effects that are hard to foresee and indirectly causes mass displacement.

---

<http://www.preventionweb.net/english/hazards/>



## ACCIDENTS

Single events can have big ramifications on people and nature, leading to injuries, deaths and destruction of habitat causing displacement.

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<http://www.ifrc.org/en/what-we-do/disaster-management/about-disasters/definition-of-hazard/industrial-accidents/>





## ARMED CONFLICT

Armed conflicts often cause loss in lives and displacement of populations. This can occur on both national level as a result of encounters between armed groups and internationally if war breaks out.

---

<http://www.ifrc.org/en/what-we-do/disaster-management/about-disasters/definition-of-hazard/complex-emergencies/>



## TECHNOLOGICAL

Industrial processes can lead to unexpected consequences such as pollution of land and sea, sometimes forcing people to move.

---

<http://www.preventionweb.net/english/hazards/technical-disaster/>

FLOOD



EARTHQUAKE



DROUGHT



VOLCANIC ACTIVITY







**STORM**



**EXTREME TEMPERATURE**



**LANDSLIDE**



**WILDFIRE**



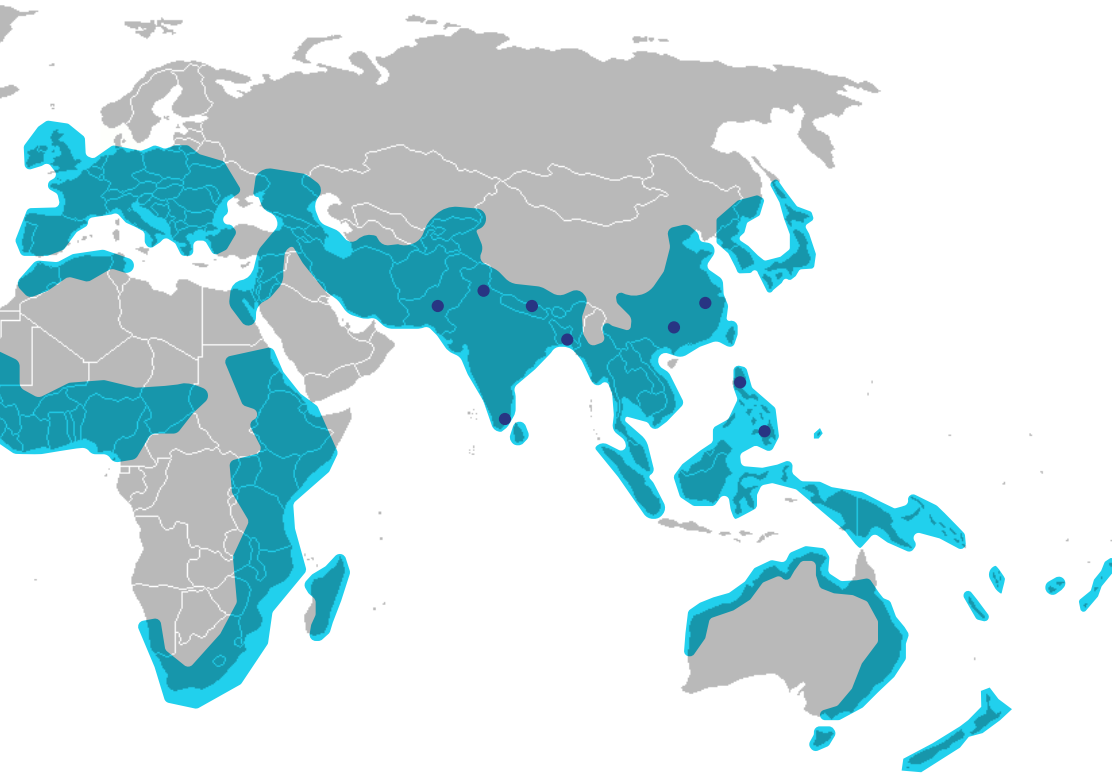
## FLOOD

**43% occurrence 1995-2015**

Most floods takes days or even weeks to develop when saturation of the ground and poor runoff leave the water no place to go. When extreme amounts of water falls in form of rain, dams rupture or levees break causing rapid inundation it classifies as a flash flood. They are often hard to forecast leaving people little or no time to evacuate. This often leads

to shortage of essential supplies such as food and water.

Flash floods can usually be divided into two phases. In the first phase people crowd for safety on high ground. This often makes living conditions poor with little privacy and poor sanitation. The second phase is when the wa-



SOURCE: [HTTP://ATLAS.PDC.ORG/ATLAS/](http://ATLAS.PDC.ORG/ATLAS/)

ter subsides and people head back to their homes often to find it damaged or demolished by debris flow created by the flood.

The debris flows that can generate during a flash flood is a destructive force that can cripple whole communities or even cities by destroying infrastructure such as bridges, pow-

er lines and water systems. Characteristics of flooding is that it usually affects large areas making distribution of aid difficult. Many are often left for days before receiving help.

In a flash flood in Venezuela 1999, roughly 30000 peoples lost their lives and over 100000 where evacuated from their homes.

<http://www.ifrc.org/en/what-we-do/disaster-management/about-disasters/definition-of-hazard/floods/>

<http://pubs.usgs.gov/of/2001/ofr-01-0144/>



## EARTHQUAKES

### 8% occurrence 1995-2015

Earthquakes are the result of forces deep within the earth's interior. Sudden break within the upper layers of the earth, sometimes breaking the surface, resulting in the vibration of the ground, where strong enough will cause the collapse of buildings and destruction of life and property.

They strike with little or no early warning and can be devastating in a matter of seconds, but after a major one, aftershocks may be as strong as a new earthquake.

Earthquakes are measured according to the Richter scale - the most devas-





SOURCE: [HTTP://ATLAS.PDC.ORG/ATLAS/](http://ATLAS.PDC.ORG/ATLAS/)

tating effects are seen on level 6 and above, and if the epicentre of the earthquake is located in highly populated areas. Magnitude scales, like the Richter magnitude scale and moment magnitude, measure the size of the earthquake at its source.

Earthquakes often trigger landslides, tidal waves and tsunamis. Powerful aftershocks frequently occur, causing further damage and increasing psychological stress.

<http://www.preventionweb.net/english/hazards/earthquake/>



## EXTREME TEMPERATURE

**6% occurrence 1995-29015**

Extreme temperatures can push the human body beyond its limits. Extreme heat and high humidity makes it difficult for the body to maintain normal temperature, young children and old adults are generally more likely to succumb to extreme heat. Extreme cold and heavy snowfall can immobilize regions leaving people stranded in their homes.

---

<http://www.preventionweb.net/english/hazards/cold-wave/>

<http://www.preventionweb.net/english/hazards/heat-wave/>



## STORM

**28% occurrence 1995-2015**

Storms is a general term defined as a disturbance of the atmosphere marked by wind and usually by rain, snow, hail, sleet, or thunder and lightning. Storms such as hurricanes are often very destructive and effect large areas. High winds cause major damage to infrastructure and housing and heavy rains can cause flooding in flat coastal areas.

---

<http://www.ifrc.org/en/what-we-do/disaster-management/about-disasters/definition-of-hazard/storms-and-tidal-waves/>

39



## LANDSLIDE

**5% occurrence 1995-2015**

The term landslide is used in its broad sense to include downward and outward movement of slope forming materials (natural rock and soil). It is caused by heavy rain, soil erosion and earth tremors and may also happen in areas under heavy snow. Landslides are difficult to estimate as an independent phenomenon as it often triggered by other hazards such as storms and earthquakes.

---

<http://www.ifrc.org/en/what-we-do/disaster-management/about-disasters/definition-of-hazard/geophysical-hazards-mass-movement-dry/>

<http://www.preventionweb.net/english/hazards/land-slide/>

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## DROUGHT

### 4% occurrences 1995-2015

Drought is, unlike rapid onset disasters, a slower phenomenon that gradually destroys an area over time. It becomes disastrous when it has exhausted a population's food stocks and resources, forcing people to move. Malnutrition is common and lowers people's resistance to disease. Water shortages force people to drink unsafe water which favours water-borne disease.

---

<http://www.ifrc.org/en/what-we-do/disaster-management/about-disasters/definition-of-hazard/drought/>



## VOLCANIC ACTIVITY

### 2% occurrence 1995-2015

Volcanic eruptions happen when lava and gas are discharged from a volcanic vent. The most common consequences of this are population movements as large numbers of people are often forced to flee the moving lava flow. Communities displaced by volcanic events often need shelter, food, water and basic healthcare.

---

<http://www.ifrc.org/en/what-we-do/disaster-management/about-disasters/definition-of-hazard/volcanic-eruptions/>



## WILDFIRE

### 3% occurrence 1995-2015

Wildfire describes an uncontrolled burning fire, usually in wild lands, which can cause damage to forestry, agriculture, infrastructure and buildings. The fire can quickly spread in high winds catching people off guard before they have time to leave the area.

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<http://www.ifrc.org/en/what-we-do/disaster-management/about-disasters/definition-of-hazard/wildfires/>



**RISK** is a forward looking concept, so disaster risk can be understood as the likelihood ,or probability, of loss of life, injury or destruction and damage from a disaster in a given period of time (adapted from UNISDR, 2015a).

**HAZARD** is a dangerous event that may cause loss of life, injury or other health impacts, as well as damage and loss to property, infrastructure, livelihoods and services, social and economic disruption and, or environmental damage is known as a hazard (UNISDR, 2009b).

**VULNERABILITY** is the name given to the set of characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard is vulnerability.

**EXPOSURE** is the presence and number of people, property, livelihoods, systems or other elements in hazard areas, and so thereby subject to potential losses, is known as exposure.

---

<http://www.preventionweb.net/risk/disaster-risk>

UNISDR, 2009b and IPCC, 2012

UNISDR, 2015a and IPCC, 2015





X



X





## UNPLANNED URBANISATION

Global urban population is 53% versus global rural population at 47%. The majority of the largest cities, known as mega cities, are in developing countries. Migration from rural to urban areas is often triggered by repeated natural disasters and the lack of livelihood opportunities. At the same time many mega cities are built in areas where there is a heightened risk for natural disasters.

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<http://www.ifrc.org/en/what-we-do/disaster-management/about-disasters/aggravating-factors/climate-change/>

Many people living in large urban centres often lack basic needs, such as, access to improved water, sanitation, security of tenure, durability of housing, and sufficient living area. The lack of livelihood leads to increasing risk of discrimination, social exclusion and ultimately violence.

---

<http://www.preventionweb.net/risk/poorly-planned-managed-urban-development>





## UNDER DEVELOPMENT

The impact of under-development is present since disaster are a development as well as a humanitarian concern.

Developed countries are better equipped to handle the impact of disasters and the following aftermath.

Under developed nations, natural disasters may trap people in a cycle of poverty because they do not have the

resources to recover to meet basic needs.

Certain factors present in poverty environments turns a natural hazard into a disaster. Such as, poorly constructed buildings, poor sanitation, rapid population growth and high density population, limited resources for disaster response and rebuilding and lack of economic safety.



## CLIMATE CHANGE

The climate change is accelerating and is here to stay. A global issue with impacts all over the world although those with the least resources have the least capacity to adapt which makes them the most vulnerable.

An increase in both the frequency and intensity of weather related events will have impact on developing countries, more particularly its poorest inhabitants. They do not have the means to

fend natural disasters. Also their economies tend to be based on climate or weather sensitive sectors such as agriculture and fishery, which makes them all the more vulnerable.

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<http://www.ifrc.org/en/what-we-do/disaster-management/about-disasters/aggravating-factors/climate-change/>

<http://www.preventionweb.net/risk/climate-change>



## HUMAN RIGHTS CHALLENGE

Natural disaster is seen as situations that create challenges mainly to the provision of humanitarian assistance. Less attention is given to the need for human rights protection in the context.

Although affected persons should be treated to enjoy the same rights and freedoms as other people. The Haiti earthquake of 2010, highlighted the fact that affected persons may face multiple human rights challenges in the aftermath of natural disasters. Dis-

crimination and disregard for human rights may emerge in the aftermath of an event, the longer the recovery phase the greater the risk of human rights violation becomes. Experience shows that existing vulnerabilities and patterns in situations of natural disasters become aggravated and in particular for displaced persons.

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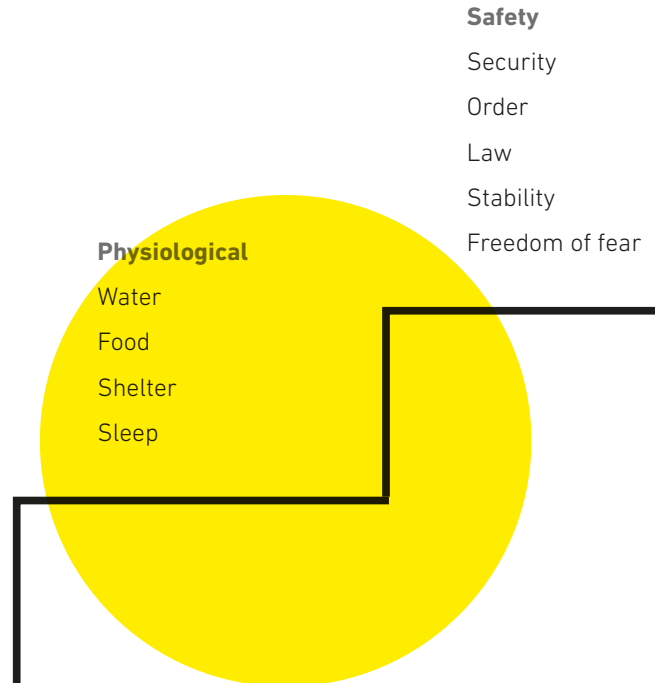
<http://www.ifrc.org/docs/idrl/I1786EN.pdf>

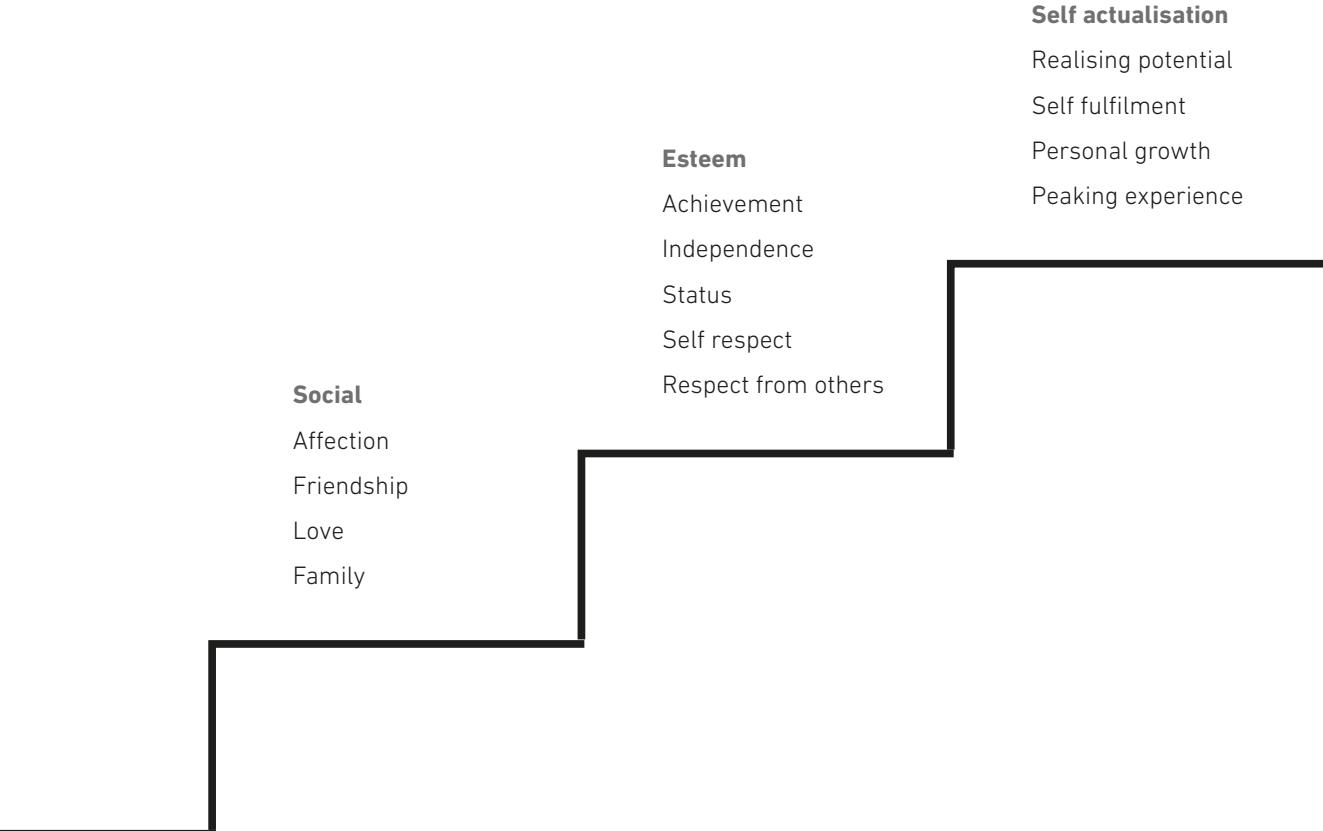
## MASLOW 'S HIERARCHY

Every person is capable and has the desire to move up the hierarchy toward a level of self-actualization. Unfortunately, progress is often disrupted by failure to meet lower level needs. Life experiences, including divorce and loss of job may cause an individual to fluctuate between levels of the hierarchy. The lower levels, physiological and safety, are hard to surpass in a catastrophic event. Applying Maslow's hierarchy of needs in a natural disaster might help determine the priority of needs.

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<http://www.simplypsychology.org/maslow.html>





RESEARCH

LEVELS OF AID



ICRC



IKEA Foundation



## OPERATING LEVELS OF AID ORGANISATIONS

After reading the UN report (Planned relocation, disaster and climate change report 2014) we adapted the way of viewing aid work in relation to their operating level, global, national and regional. We also added an individual level since we thought it was missing. We have chosen to call regional level for communal level since it is less of an elevated view and grants the people making up the community a more active role.





## GLOBAL PREPAREDNESS AND RESPONSE

**On global level organisations like UN, UNHCR, UNISDR and states tries to find long term goals for improving preparedness and reducing risk. The UN branch responsible for building frameworks for risk awareness and risk reduction planning (UNISDR) have generated The Sendai framework which suggests a series of goals that should be used as guidelines for preventive work until 2030:**

Substantially reduce global disaster mortality by 2030, aiming to lower the average per 100,000 global mortality rate in the decade 2020–2030 compared to the period 2005–2015;

Substantially reduce the number of affected people globally by 2030, aiming to lower the average global figure per 100,000 in the decade 2020–2030 compared to the period 2005–2015;9



Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030;

Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030;

Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020;

Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of the present Framework by 2030;

Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to people by 2030.

Priority 1: Understanding disaster risk.

Priority 2: Strengthening disaster risk governance to manage disaster risk.

Priority 3: Investing in disaster risk reduction for resilience.

Priority 4: Enhancing disaster preparedness for effective response and to “Build

Back Better” in recovery, rehabilitation and reconstruction.

The outcome and goal of the Sendai framework 2015-2030 is:

-The substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries.

-Prevent new and reduce existing disaster risk through the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political and institutional measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience.

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UN Sendai framework for disaster and risk reduction  
1015-2030.pdf, 9-11 Rue de Varembe CH 1202, Geneva  
Switzerland

Planned relocation, disasters and climate change: consolidating good practices and preparing for the future report.  
Sanremo, Italy, 12-14 March 2014



## NATIONAL PREPAREDNESS AND RESPONSE

On national level organisations such as the red cross red crescent work for adoption of better policy's. Nations often have their own agency's working with problems regarding risk reduction and preparedness.

Tools that can be utilised by governments is relocation of communities in disaster prone areas, building dams, levees and flood channels to prevent inundation and implementing better regulations for construction of buildings.

NGOs operating at national level usually have their own branch with their own head quarters and field offices which makes it possible to assess regional needs and plan for specific conditions. Although the NGOs' work is extremely important it is often limited by legislation and policy and ultimately the government also needs to engage in risk reduction to make it effective.

To reduce disaster risk, the IFRC has three main strategies: to strengthen the preparedness and capacities of communities so that they are in a better position to respond when a disaster occurs; to promote activities and actions that mitigate the adverse effects of hazards; and to protect development projects such as health facilities from the impact of disasters.

Disaster preparedness refers to measures taken to prepare for and reduce the effects of disasters. That is, to predict and, where possible, prevent disasters, mitigate their impact on vulnerable populations, and respond to and effectively cope with their consequences.

Disaster preparedness provides a platform to design effective, realistic and coordinated planning, reduces duplication of efforts and increase the overall effectiveness of National Societies, household and community members disaster preparedness and response efforts. Disaster preparedness activities embedded with risk reduction measures can prevent disaster situations and also result in saving maximum lives and livelihoods during any disaster situation, enabling the affected population to get back to normalcy within a short time period.

Disaster preparedness is a continuous and integrated process resulting from a wide range of risk reduction activities and resources rather than from a distinct sectoral activity by itself. It requires the contri-

butions of many different areas—ranging from training and logistics, to health care, recovery, livelihood to institutional development.

In recent years, there has been a growing recognition that strengthening resilience to disasters is not only about disaster management but an essential component of all emergency and development programming. Communities/households with sustainable livelihoods, good levels of health care and access to a strong and accountable civil society are less susceptible to hazards and faster to recover. However, it is also important that these development gains are protected from disasters.

The International Federation has made it a priority to ensure that disaster risk reduction is an integral part of its development work and that all its programmes work towards disaster risk reduction in an integrated and mutually supportive way. The Safer Communities initiative is working at all levels – governance, policy, management and practice – to achieve this, while continuing to promote disaster preparedness and disaster mitigation.

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<https://www.akut.org.tr/en>

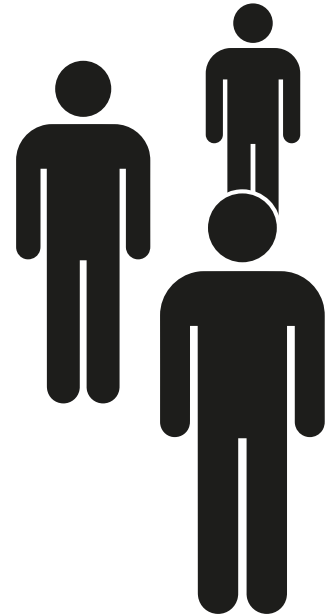
<http://www.ifrc.org/en/what-we-do/disaster-management/preparing-for-disaster/risk-reduction/building-safer-and-resilient-communities/>

<http://www.ifrc.org/en/what-we-do/disaster-management/preparing-for-disaster/>

## COMMUNAL PREPAREDNESS AND RESPONSE

At communal level it might be hard for both NGOs and governments to monitor risks and assess needs of the area. Therefore they rely on volunteers and municipal offices to report back and to be able to work autonomously in between. This makes training and education very important so that communities can strengthen themselves and learn to handle area specific problems. IFRC uses standardised material to educate volunteers in the field where the first priority is to identify risk assess who could be affected and how it should be handled if something was to happen.

Engaging the communities and people is also shown to be very effective when it comes to reducing risk. Communities that engage to repair, educate and train for disasters have a better reliance. Some of the activities that have proven to be very effective is flood monitoring in Bangladesh that relies on inhabitants to make weekly reports of water levels across the country. Gov-





ernment instigated a project to build analogue water level poles visible from residences on the river banks. Residents were asked to report water level changes when they occurred rapidly and generally on a weekly basis to the municipality office who then collected and transferred the data to a government agency that can issue warnings in case of emergency. This is an early warning system that engages the inhabitants to be aware of early signs and hopefully have more time to evacuate before the area floods.

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ICRC and IFRC Guidelines for assessment in emergencies March 2008

IFRC Introduction to Disaster Preparedness: Disaster Preparedness Training Programme, June 2000

<http://www.give2asia.org/disaster-preparedness-and-resilience-bangladesh/>

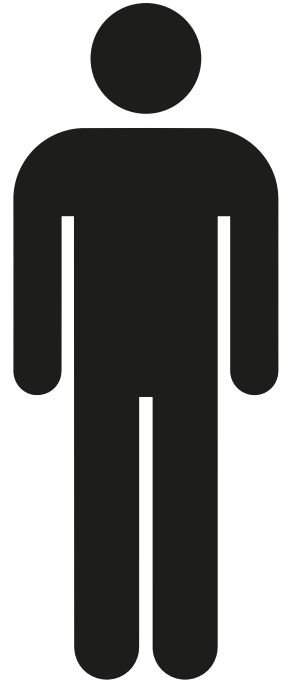
[https://www.deltares.nl/app/uploads/2015/11/Deltares-Mobile-Services-for-Early-Warning-in-Bangladesh-Final-Report\\_web.pdf](https://www.deltares.nl/app/uploads/2015/11/Deltares-Mobile-Services-for-Early-Warning-in-Bangladesh-Final-Report_web.pdf)

## TAKE CHARGE

Affected persons should be informed and consulted on measures taken on their behalf and given the opportunity to take charge of their own affairs to the maximum extent and as early as possible. They should be able to participate in the planning and implementation of the various stages of the disaster response. Targeted measures should be taken to include those who are traditionally marginalized from participation in decision-making.

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<http://unhcr.org/50f94d4e9.html>



## INDIVIDUAL PREPAREDNESS AND RESPONSE

At individual level it is up to each and everyone to be prepared and know the potential risks of the area. There might be possibilities for engaging in risk education given by IFRC or government officials but it is not for everyone. Some might think they don't need it others have simply more urgent problems that need their attention. This is a problem in many cases, that a disaster might strike, but it's not certain when. This makes the threat less imminent and is easier to ignore.

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IFRC. Introduction to disaster preparedness, disaster preparedness training programme (2000). <http://www.ifrc.org/Global/Publications>

## EARTHQUAKES IN FOCUS

We felt the need to establish some frame for our research to get forward in the project. After analysing the existing research we united on focusing on one type of disaster. This would enable us to reach more specific scenarios and understand one type of disaster event more thoroughly.

Earthquakes was the most logical choice for us. It is a well defined hazard, both within a limited time frame and a limited area. This makes it easier to measure the consequences that follow an earthquake event.

Geophysical hazards stands for 8% of all natural hazards by occurrence. Earthquakes can have big ramifications on soci-

eties, even small quakes can lead to damages to infrastructure and homes.

It is almost impossible to predict the time and place of big movements in the earth's crust. This also makes earthquakes hard to predict. They usually unfolds rapidly, lasting only seconds or minutes. The nature of earthquakes makes them impossible to prevent. Instead preventive measures need to be taken.

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UNISDR. the human cost of weather related disasters 1995–2015. Cop21 Paris 2015

<http://www.ifrc.org/en/what-we-do/disaster-management/about-disasters/definition-of-hazard/geophysical-hazards-earthquakes/>





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RESEARCH

RESPONSE

## FIRST AID TO ARRIVE

After an earthquake the first humanitarian assistance is not provided by international bodies but comes from local sources. Since aid takes time to mobilise the local organisations response is often the most effective given the critically short time frame to save victims. The aim is to define basic practical standard humanitarian assistance, specifically that immediately relevant to saving lives, water, food and sanitation for example. Although minimum standards already exist the problem is that there are often different standards competing with each other as well that the existing standards are outmoded or incomplete.

The minimum standards also apply for the local organisations that provide aid since they by definition also are affected by the event may too need assistance.

The responsibility for providing humanitarian relief falls on many shoulders but it is the duty of governments and international bodies to demonstrate political will in preventing, mitigating and alleviating disasters wherever possible.

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<https://www.icrc.org/eng/resources/documents/misc/57jpje.htm>

## HAITI VS CHILE 2010

In 2010 earthquakes struck Haiti and Chile with different outcome. A combination of geological differences, comparative wealth, as well as social factors explain why the smaller earthquake in Haiti was more deadly.

Haiti was hit with a 7.0 Richter scale earthquake which resulted in 230, 000 fatalities. The high death toll reflected the exposure of large numbers of people, and vulnerability factors such as extreme poverty, corruption, a fragile democracy, and a lack of earthquake experience in a country .

In contrast, the earthquake in Chile was by any standards an extreme event, releasing five hundred times more energy than the earthquake in Haiti. However it resulted in 525 fatalities, only a fraction of those who died in Haiti. The explanation is that the exposure was lower, and Chile has a history of dealing with earthquakes. It is also an upper-middle-income country with a consolidated democracy and low levels of corruption.

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<http://theweek.com/articles/496367/quake-comparison-chile-vs-haiti>

<http://www.earthmagazine.org/article/chiles-quake-larger-less-destructive-haitis>

<http://global.britannica.com/event/Chile-earthquake-of-2010>

[http://www.bustler.net/index.php/article/bamboo\\_lakou\\_wins\\_the\\_architectural\\_associations\\_2013\\_foster\\_partners\\_prize/](http://www.bustler.net/index.php/article/bamboo_lakou_wins_the_architectural_associations_2013_foster_partners_prize/)

[http://www.ifrc.org/Global/Publications/disasters/208400-First%20anniversary%20Haiti%20EQ%20operation%20report\\_16b.pdf](http://www.ifrc.org/Global/Publications/disasters/208400-First%20anniversary%20Haiti%20EQ%20operation%20report_16b.pdf)



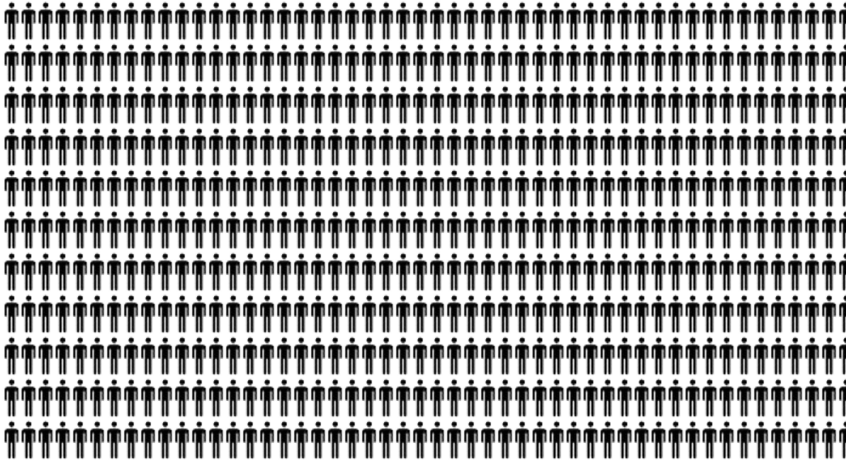


65



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7.0 magnitude



230 000 fatalities

8.8 magnitude



525 fatalities

67

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224

## DISPLACEMENT

The differences in building construction, Chile conducts stronger building codes, in the two countries resulted in less fatalities and damage in Chile. Nonetheless both events resulted in an equally large number of the population becoming displaced.

<http://www.treehugger.com/sustainable-product-design/comparing-haiti-and-chile-did-building-codes-save-lives.html>





2010 Haiti earthquake displaced 1,500,000



2010 Chile earthquake displaced 1,500,000



RESEARCH

CASE STUDY

## **UNHCR AND IFRC**

UNHCR shares leadership of the emergency shelter cluster with IFRC. The refugee agency leads in conflict-generated displacement, while the IFRC leads in natural disaster situations. Shelter is a top priority, providing protection from the climate ensuring privacy and dignity providing personal safety and security. UNHCR's goal is to store tents for 250,000 people - 50,000 tents for dispatching to disaster areas.

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<http://www.unhcr.org/pages/49c3646cf2.html>



RESEARCH

CASE STUDY

## NEPAL 2015

The Nepal earthquake of 2015 occurred without warning, leaving thousands without food, water, or shelter. As of April 30, 2015, there are 2.8 million Nepalese people that have been displaced, and over 6,000 dead

There is a massive need for shelter and an insufficient supply of tents, leading to overcrowding in camps.

A citizen of Kathmandu describes the problem as follows: “My daughters have problems changing their clothes, sleeping and studying.”

Even in places where citizens have received tents, these tents are not designed to keep out the rain and food cannot be kept dry. This will be a huge issue with monsoon season quickly approaching.

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[http://www.quakehelpdesk.org/lat\\_on\\_field2.php](http://www.quakehelpdesk.org/lat_on_field2.php)

<https://sustainabilityforallofus.wordpress.com/2015/04/26/research-proposal-for-environmental-protection-agency-implementing-earthships-in-developing-countries-susceptible-to-earthquakes/>





## **DEFINITION OF SHELTER**

One of the first things that people need after being forced to flee their homes, whether they be refugees or internally displaced, is some kind of a roof over their head. A secure habitable living space that provides privacy and dignity. Protection from the climate and to enhanced resistance to disease. Provide dignity and security, a private space. Livelihood to encourage self sufficiency.

## **SHELTER POSSIBILITIES**

The possibilities for temporary housing or shelter, differ but may be one or more from the following. Stay with family or friends with liveable homes, repair own house, live in a temporary structure such as shelter or tent, live in a shared building such as schools and an organised aid camp.

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<http://www.ifrc.org/PageFiles/95526/publications/D.03.a.07.%20IFRC%20shelter-kit-guidelines-EN-LR.pdf>

## STRUCTURAL MEASURES

Any physical construction to reduce or avoid possible impacts of hazards, or application of engineering techniques to achieve hazard-resistance and resilience in structures or systems.







## **NON-STRUCTURAL MEASURES**

Any measure not involving physical construction that uses knowledge, practice or agreement to reduce risks and impacts, in particular through policies and laws, public awareness raising, training and education.

**PROACTIVE****What could happen?**

A country is considered to have a proactive approach when preparedness measures are taken before a hazardous event happens and learns from mistakes so they can be prevented in the future and mitigate the recovery.



**REACTIVE**

### **What has happened?**

Having a proactive approach is to be regarded a privilege not everyone can afford. Lack of knowledge or resources can result in a country addressing risk first when disaster already have struck. They are left with rescue, relief and rehabilitation measures and recovery becomes harder.

## USA

In the US there is a subculture based around preparing for catastrophic events. Many consider it necessary to train, stock and plan for emergencies.

<http://www.metro.us/lifestyle/today-s-doomsday-preppers-a-closer-look-at-survivalist-culture/tmWnib---2eLoFtUHD4bk/>



## JAPAN

“Bousai” is the Japanese word for disaster preparedness. Japan can be considered preparedness professionals, unlike the US most of the population in Japan live in constant risk of natural hazards. Awareness and preparedness is part of the culture and reinforced by high building standards and early warning systems.

<http://www.metro.tokyo.jp/ENGLISH/GUIDE/BOSAI/>



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## TURKEY

In an interview done by Gülben Sanli with turkish rescue team AKUT, team leader Cilasun Bayülgen said "Turkey is a more re-active society than pro-active society. People are prone to talking about the situation after disasters occur and details of situation are discussed intensely on television shows however, people are not prone to taking precaution before the disaster." as response to the level of preventive measures taken in Turkey.

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Gulben Sanli. Conflict, An Earthquake Project. 2014  
Lund University.

## ATTITUDES TOWARDS PREPAREDNESS

In **Conflict, An Earthquake Project** by Gülben Sanli, a master diploma work from Lund university, it is concluded that many people especially younger generations are not prone to take preparedness measures. In interviews one stated that she once had a preparedness kit but it reminded them of the overhanging risk of earthquakes and made her more nervous. Others stated that they, after experiencing an earthquake, took preparedness measures.

In the report Gülben also concludes that it is important to make earthquake preparedness more unobtrusive in daily life.

### Did you have take any precautions after the earthquake?

I made a backpack full of needs, but it made me more nervous than before. It was there beside my bed.

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Gulben Sanli. Conflict, An Earthquake Project. 2014 Lund University.





### Hidden yet available

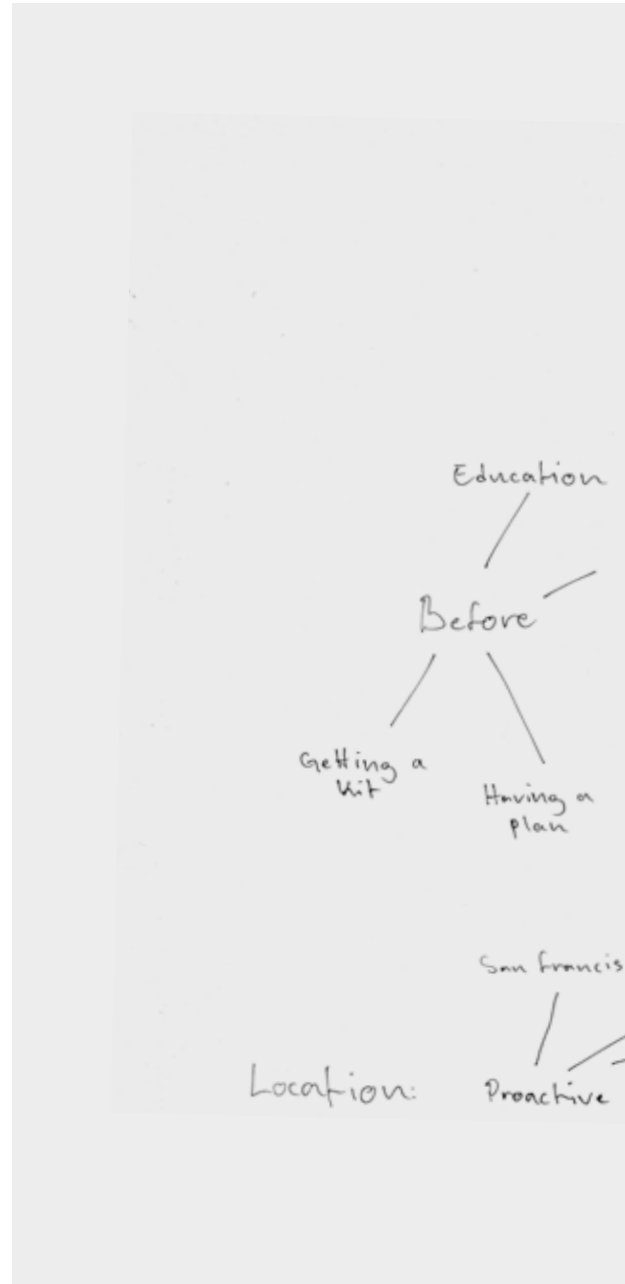
We explored how items in the home are made “invisible” yet remain available for usage.

1. Surveillance camera
2. Fridge
3. Fire alarm
4. TV
5. Vacuum cleaner
6. WiFi routers



# ***ANALYSIS***

Our research made us realise that earthquake preparedness and risk reduction is considered a matter for governments, NGOs and cross national cooperation, it is seldom articulated as a matter of the individual. A problem that might occur with this mindset is that victims of disaster are left clueless until help arrives. We see a possibility to, as an addition to the regular aid systems, encourage and enable people to take preparedness measures on their own without obstructing standardised aid systems.







~~co Tokyo Istanbul Kathmandu Haiti~~

vs Reactive society

ANALYSIS

CONCLUSION





## WHERE WE MATTER

Our conclusion is that we need individuals to take increased responsibility for their safety in order to mitigate the situation of a disaster. This is to empower people in difficult situations but also to help relieve aid organisations so they can make better prioritisations.

# ***BEFORE UNDER AFTER***

To cover earthquake aid scenarios the solution need to address a continuous time line starting with preparedness before an event occurs.

The solution is individual and not depending on external organisations or government to deliver when needed. It is already in the hand of the user before an earthquake event.

The solution enables the user to self help in a critical situation when forced to evacuate the home or the area.

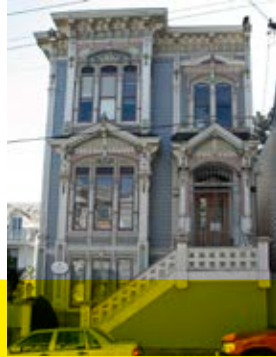
The solution is a supplement to the aid given by government and NGOs.





## 72 HOURS

After a major event the basic rule of thumb is for people to be able to take care of each other for 72 hours before help arrives.



## PREPAREDNESS

It requires preparation for people to be able to cater for themselves and be ready for an event.



## EARTHQUAKE

While being careful of what is happening around you, you should move quickly to a place where you will be protected from falling objects or furniture.



## EVACUATION

Wait until the tremor subsides then secure an exit.



## TAKE CHARGE

Take charge of one's own affairs to the maximum extent and as early as possible.



## LOCAL AID

The first humanitarian assistance comes from local sources.



## AID ARRIVES

Help organisation mobilises assistance focusing on food, water and aid.

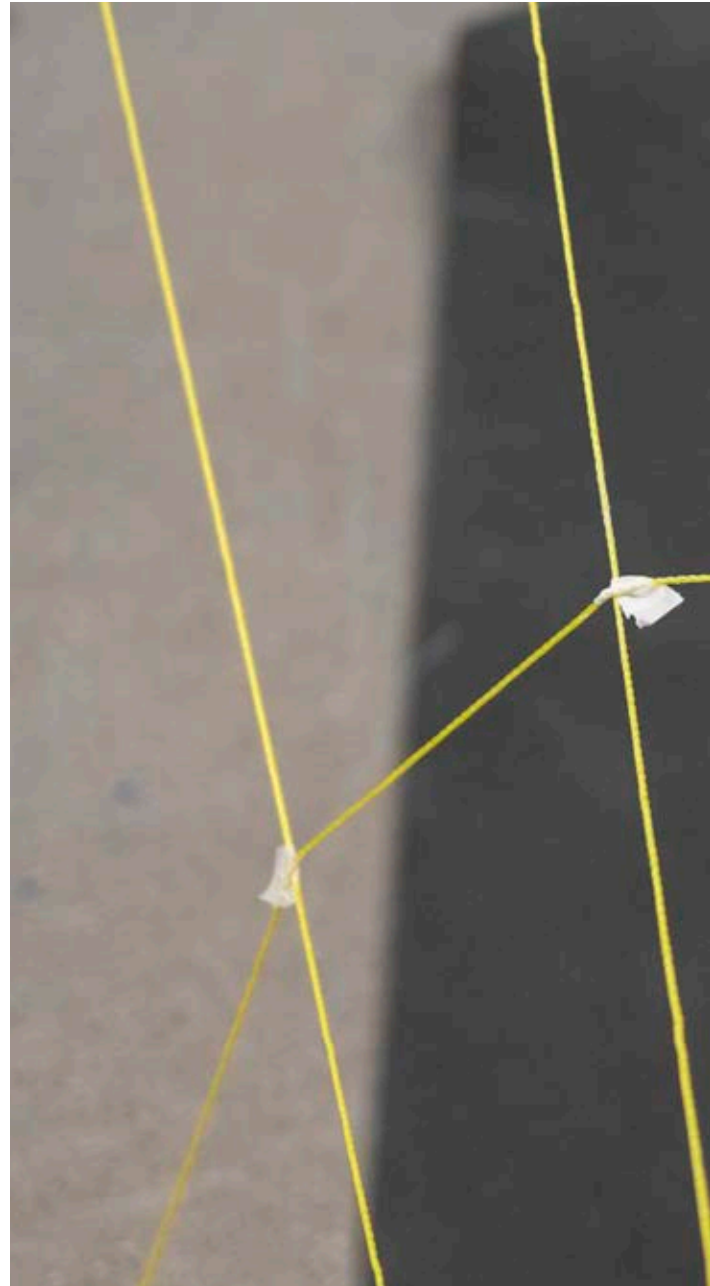


## RECOVERY

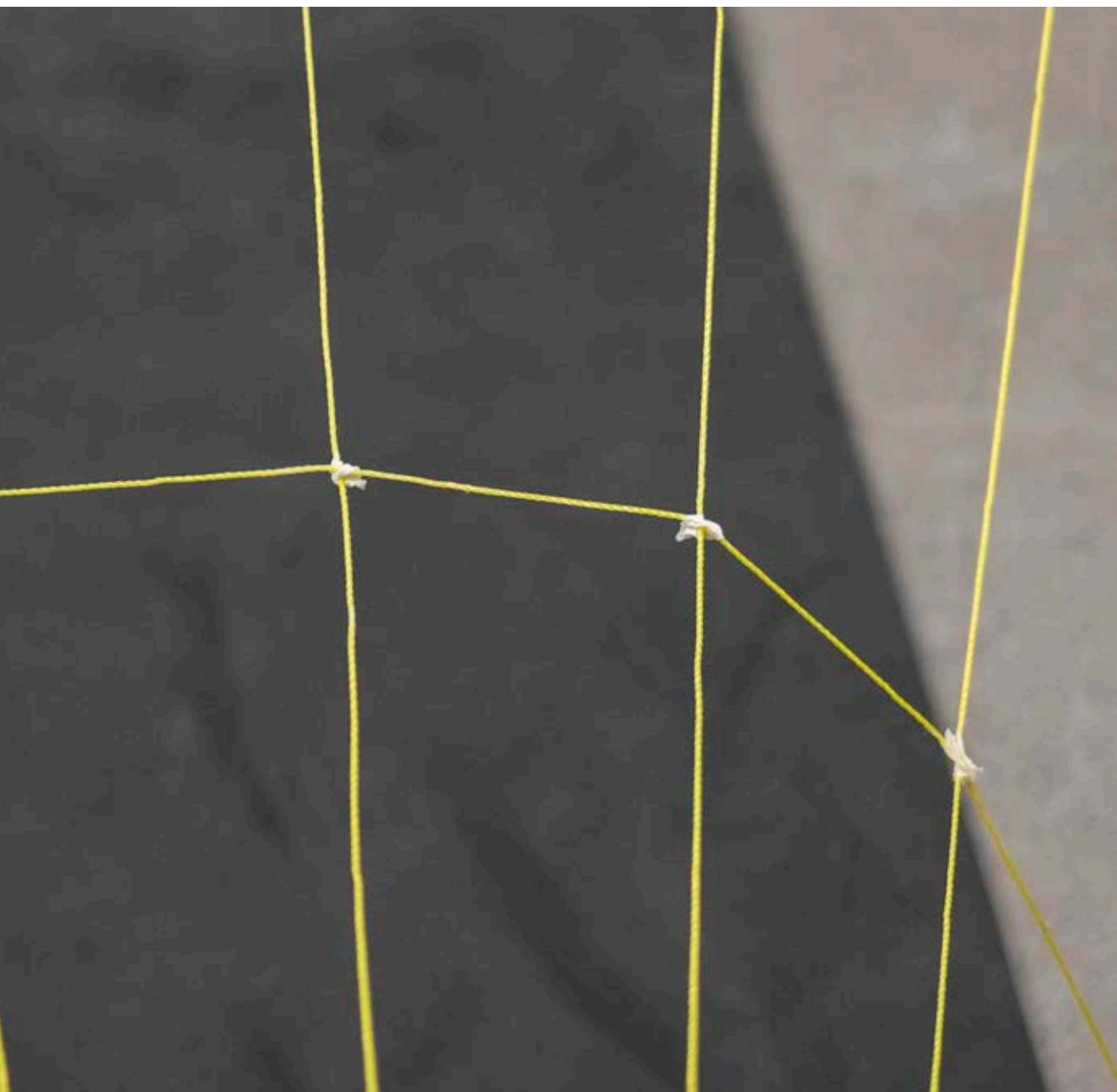
The road to recovery starts when the disaster strikes.

## ***IDEATION***

During the research phase we tried to come up with all types of early ideas and possible solutions. It could be functional ideas as well as how to approach the complexity of the event. When we started our ideation phase those ideas resulted in our first concepts.





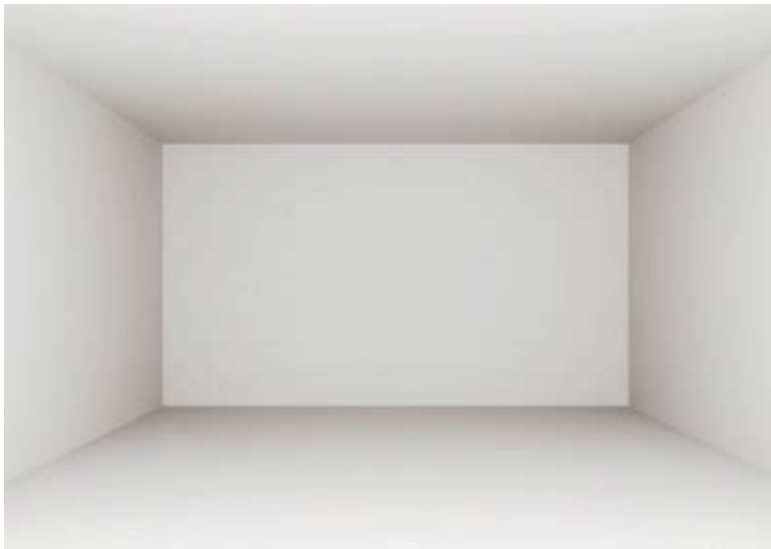
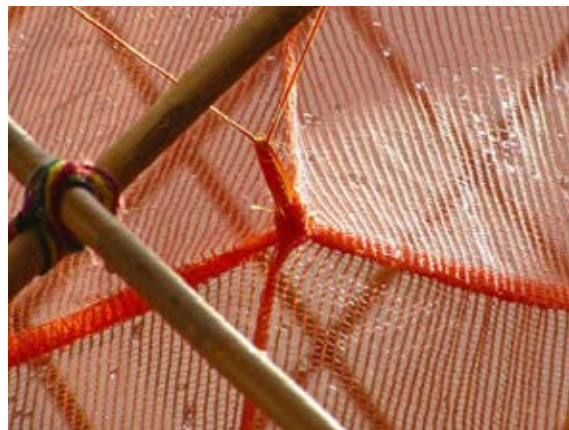


MULTIFUNCTIONAL

COMMUNICATION

LIVELYHOOD

HOME



IDEATION

VISUAL BRAINSTORM

UNOBTRUSIVE

SURVIVAL

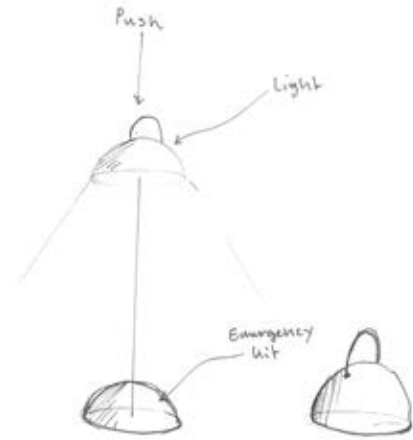
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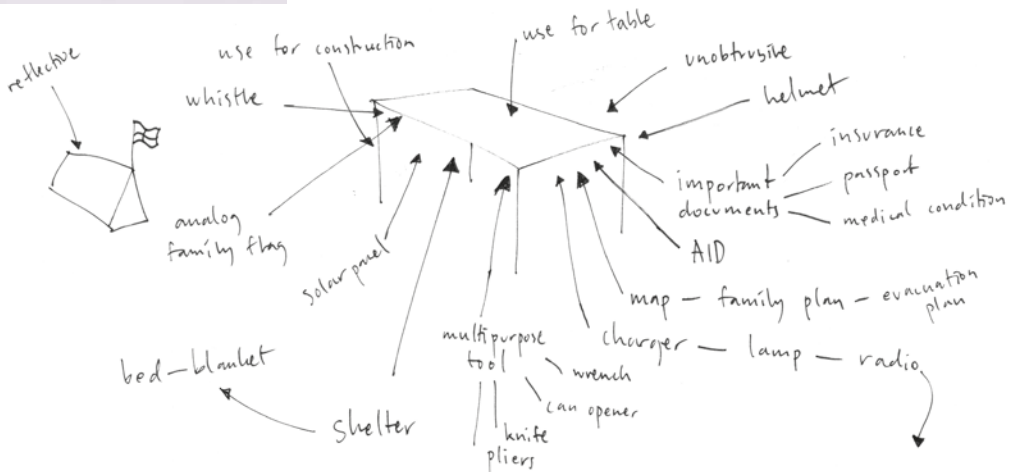
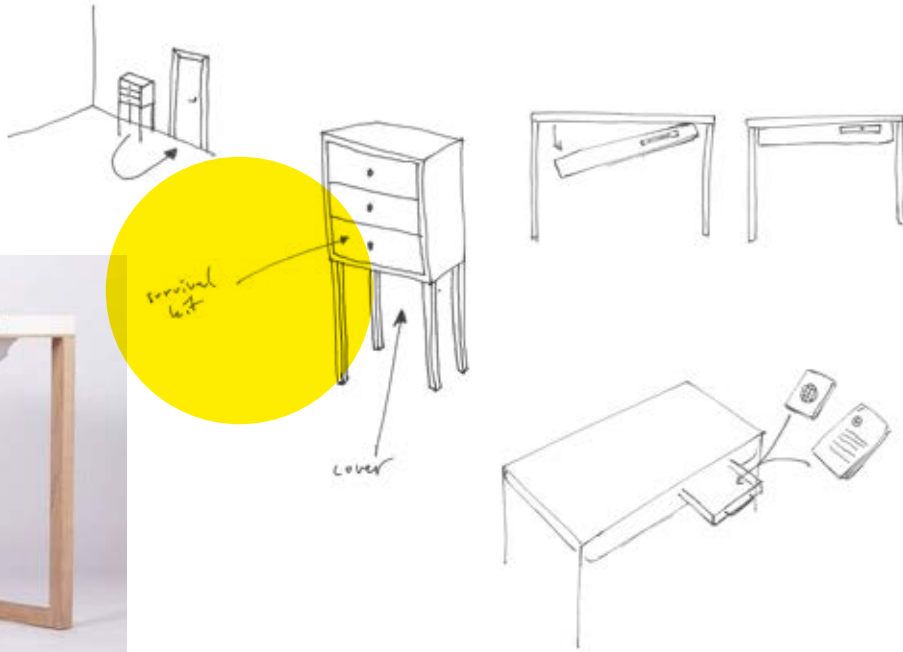
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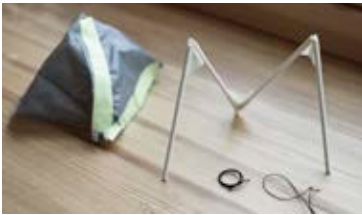
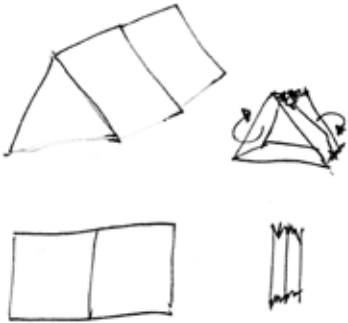


## UNOBTRUSIVE FURNITURE

One of the early and first concepts was how to make the solution available but more unobtrusive in the home environment. How it could be camouflaged or hidden in a furniture.

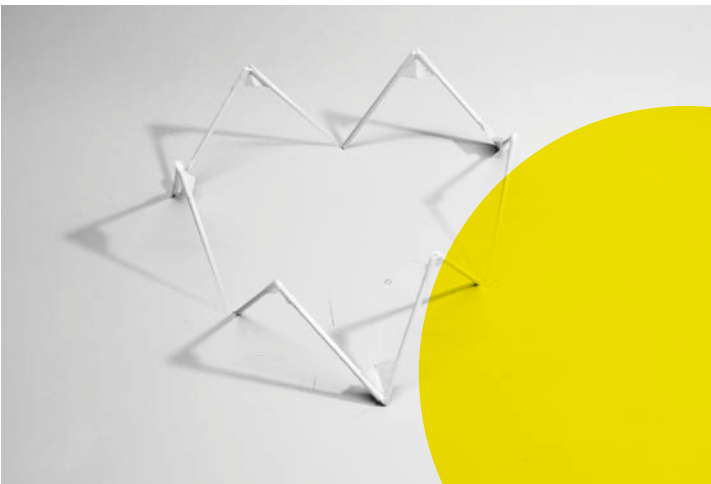


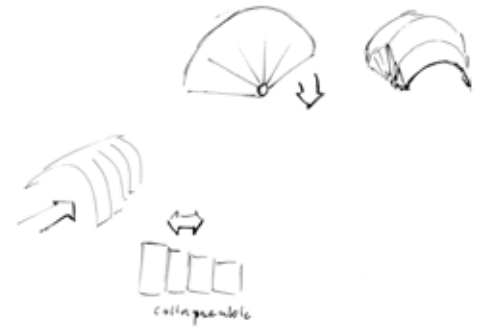
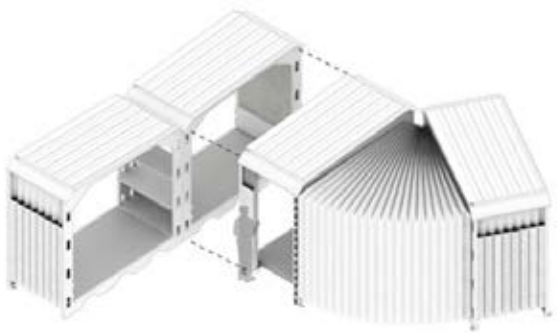
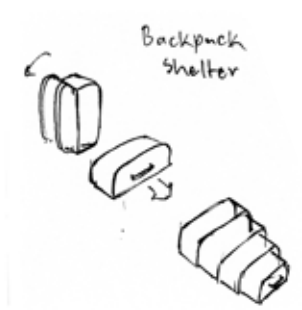




IDEATION

FIRST IDEAS





## ACCORDION SHELTER

Drawing inspiration from Makers with Agendas accordion trestle, designed by Julien de Smedt, the idea of an accordion shelter frame to allow more than one shelter to be combined into a modular system. That would allow large families to combine their shelters into a common space.

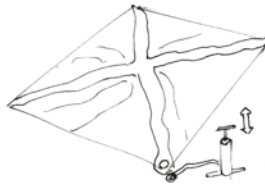
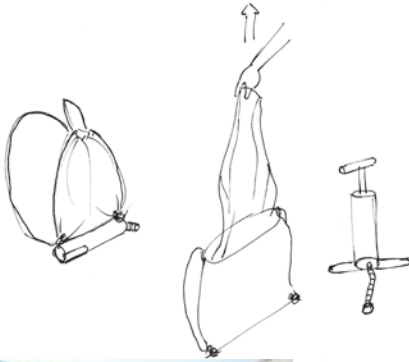
## INFLATABLE

The shelter need some sort of structure to enable more than just a space for sleeping, for example allow a private space for changing clothes. The idea to inflate the structure with air to make a lighter solution without adding weight.

Airbag suit



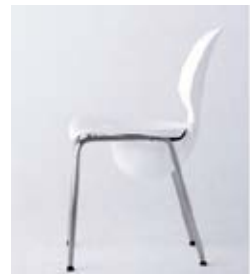
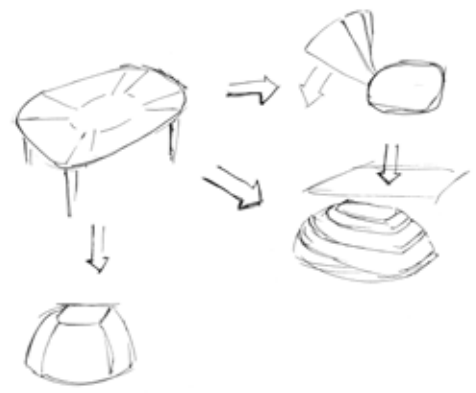
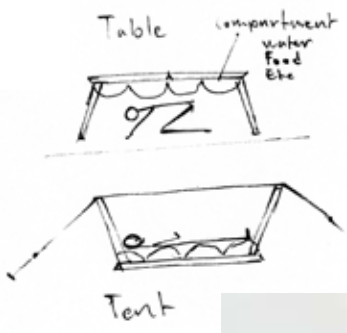




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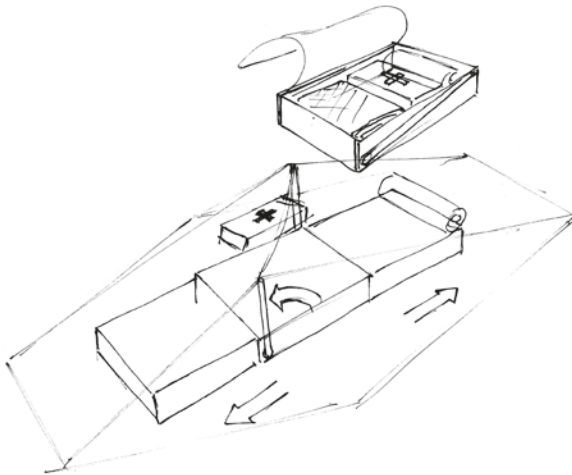






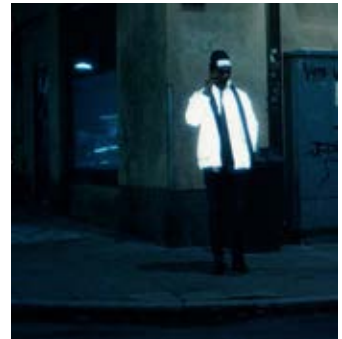
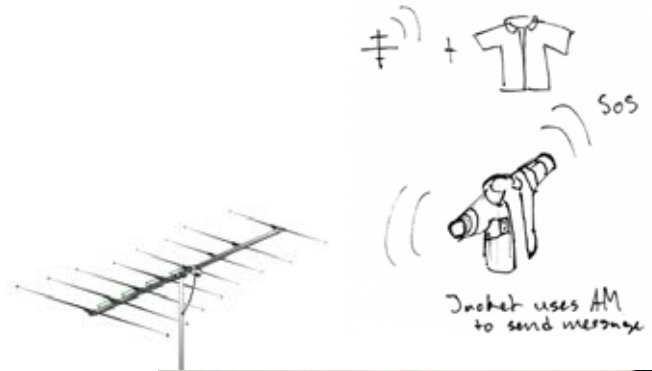
## FURNITURE KIT

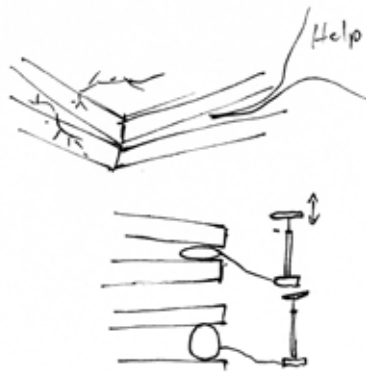
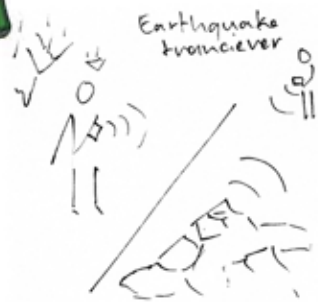
The moment an earthquake strikes you should move quickly to a place where you will be protected from falling objects or furniture and other heavy items toppling over or sliding onto you. One idea was to combine the furniture to protect you in the moment and integrate the solution when to evacuate as well.



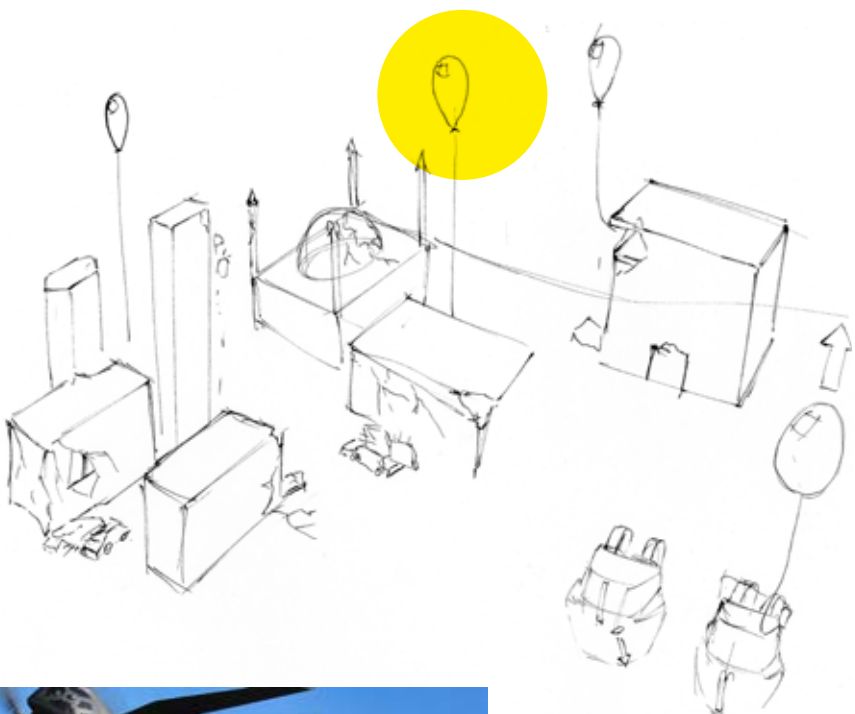
## RESCUE

We generated ideas around the scenario of rescue missions. How to communicate or signal for help. As well as, how rescue workers could lift heavy rubble to rescue buried victims.

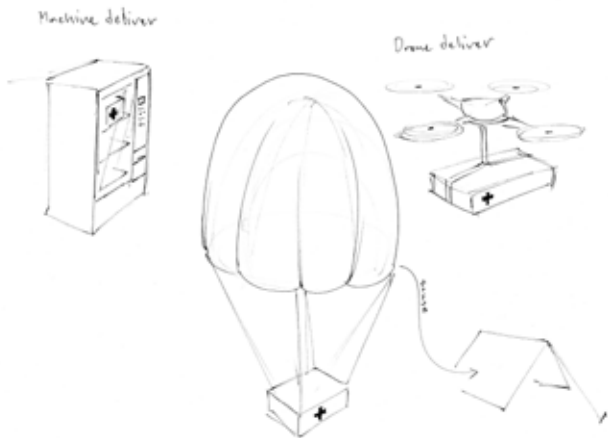




IDEATION



FIRST IDEAS



## DELIVERING GOODS

Ideation on how to make aid available for victims and alternative way to deliver.

IDEATION

CONCEPTS

*CULTURE*

*CONCEPT*

PROACTIVE

REACTIVE

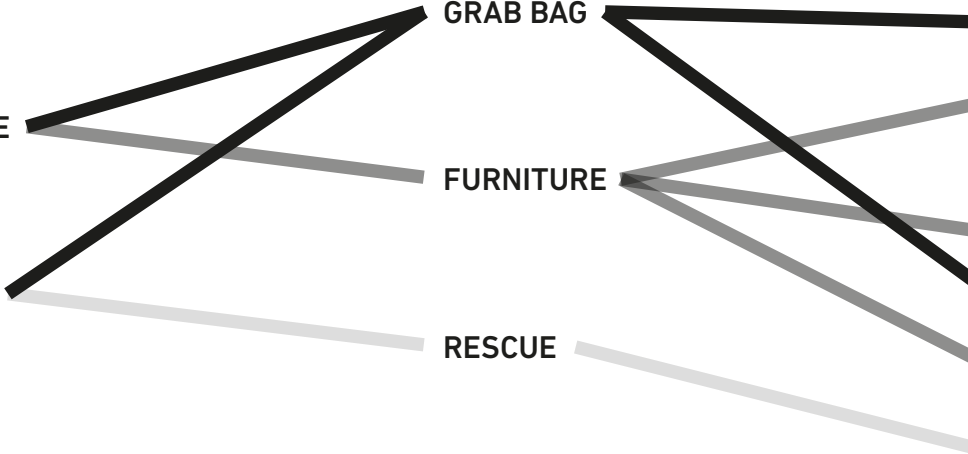
GRAB BAG

FURNITURE

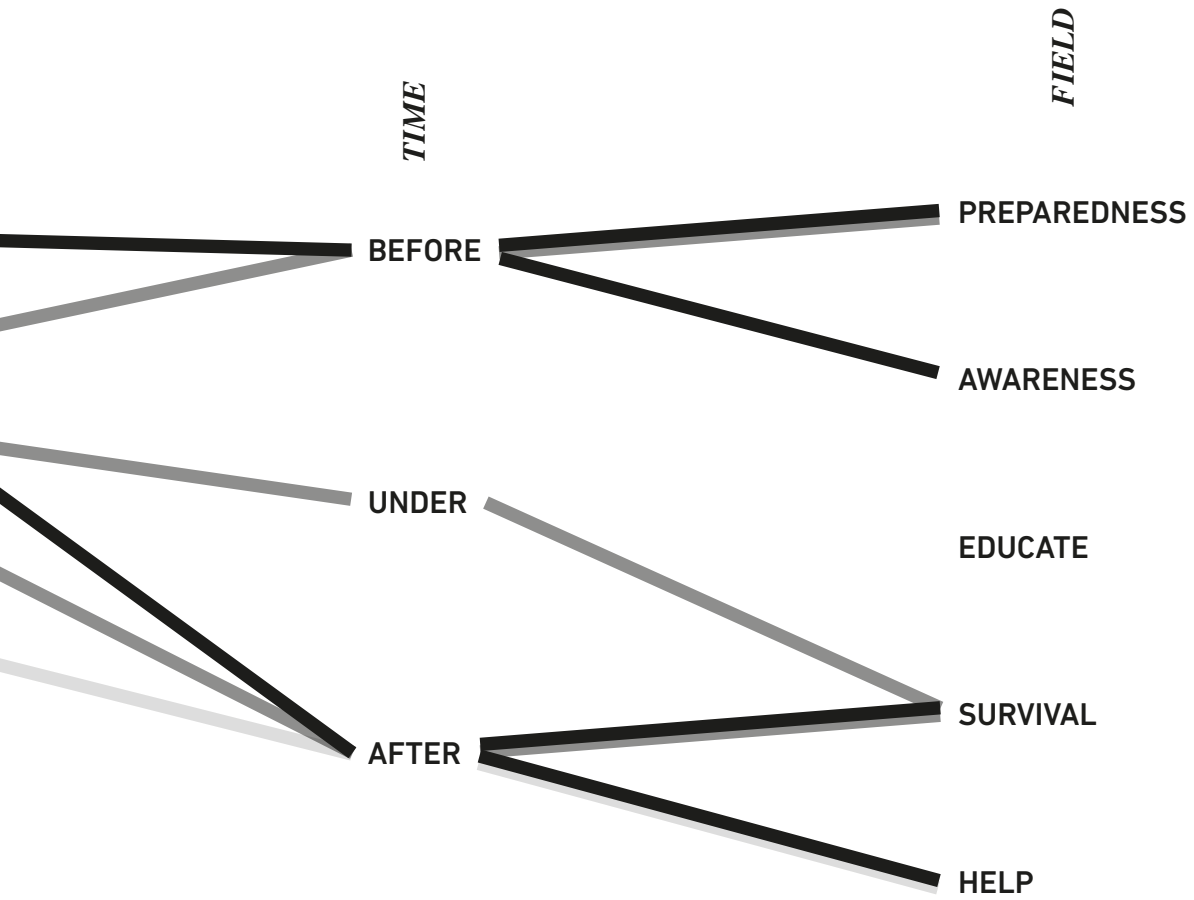
RESCUE

IN BED

KIDS







109

224

IDEATION

CONCEPTS

***CULTURE***

***CONCEPT***

***TIME***

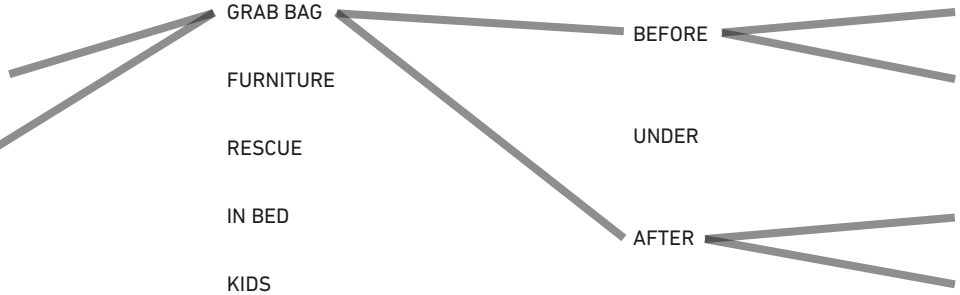
***FIELD***

PROACTIVE  
REACTIVE

GRAB BAG  
FURNITURE  
RESCUE  
IN BED  
KIDS

BEFORE  
UNDER  
AFTER

PREPAREDNESS  
AWARENESS  
EDUCATE  
SURVIVAL  
HELP

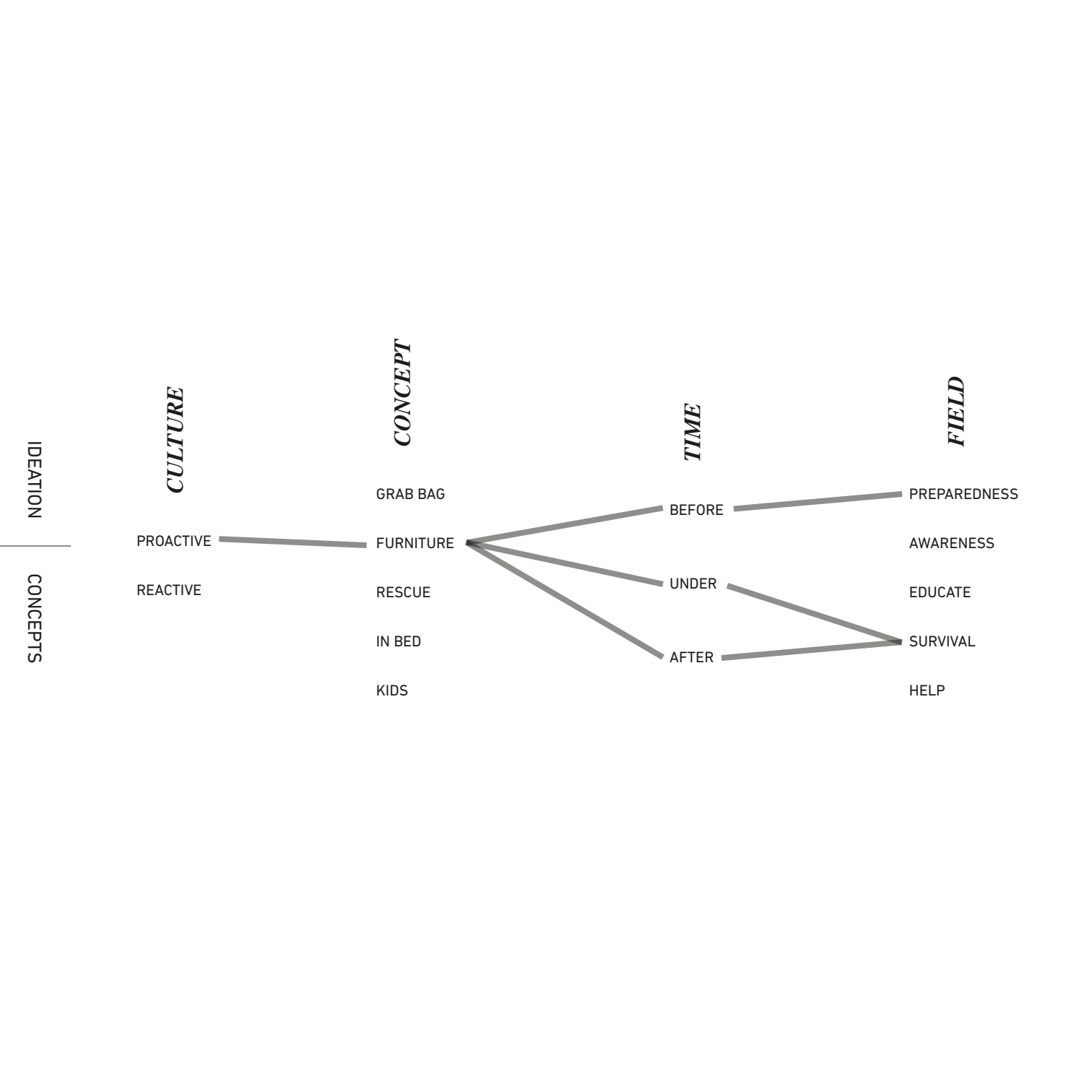




## GRAB BAG

The concept focus on leaving the home in a earthquake with necessary equipment. **The grab bag contains shelter** and other vital equipment to sustain life **for 72 hours**.

It is the one thing that is brought in an emergency situation and provides a **sense of security** in the knowledge that the user can **take charge** if needed in an emergency.





## FURNITURE

Furnitures can be sturdy structures that provide protection in an earthquake. The concept is to **integrate a preparedness kit** in a already existing structures in the home.

This would position the kit where it would be logical to take cover while also integrate it **in the home environment**.

IDEATION

CONCEPTS

***CULTURE***

PROACTIVE  
REACTIVE

***CONCEPT***

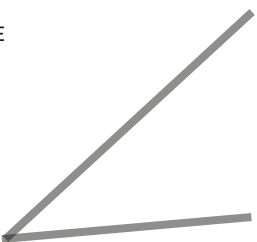
GRAB BAG  
FURNITURE  
RESCUE  
IN BED  
KIDS

***TIME***

BEFORE  
UNDER  
AFTER

***FIELD***

PREPAREDNESS  
AWARENESS  
EDUCATE  
SURVIVAL  
HELP





## RESCUE

After evacuating the home, new problems emerge. To **communicate with rescue personnel** and engage in rescue work. The rescue concept focus mainly on **the time frame after an earthquake.**

The rescue concept can help **raise awareness** of risks and help people **take preparedness measures.**

## RESCUE



## FURNITURE





## GRAB BAG



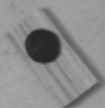
We saw potential in all concepts since they are more or less overlapping. We regard the **grab bag as the core** concept since both rescue and furniture relies on some sort of kit that can be brought outside of the home.

**Building upon the grab bag** we want to implement elements of the other concepts to create a solution that has better coverage.

## ***GRAB BAG RESEARCH***

In the concept research we look into more specific details regarding our grab bag concept. We look at existing preparedness kits, shelter solutions and materials as well as other sub product categories to preparedness kits. The aim of the research is to establish what is needed in the kit and how we can make an addition to the field of preparedness kits.

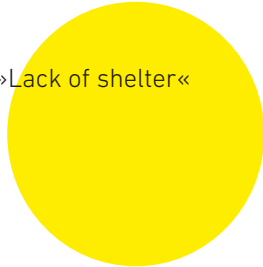




## BUILD A KIT

There are guidelines of what you need to be prepared to take care of your own safety in case of a disaster. We looked at different lists and guides available and chose a few to highlight the common denominators.

»Lack of shelter«



## RED CROSS

WATER  
FOOD, NON-PERISHABLE  
FLASHLIGHT  
BATTERY-POWERED RADIO  
HAND-CRANK RADIO  
EXTRA BATTERIES  
FIRST AID KIT  
PERSONAL MEDICATIONS  
MEDICAL INFORMATION  
MEDICAL ITEMS  
SANITATION AND PERSONAL HYGIENE  
IMPORTANT DOCUMENTS  
MEDICAL INFORMATION  
PROOF OF ADDRESS, DEED TO HOME  
PASSPORTS AND BIRTH CERTIFICATES  
INSURANCE POLICIES  
CELL PHONE WITH CHARGERS  
FAMILY CONTACT INFORMATION  
EXTRA CASH  
EMERGENCY BLANKET  
MAPS OF THE AREA  
EXTRA CAR KEYS AND HOUSE KEYS  
MULTI-PURPOSE TOOL  
MANUAL CAN OPENER  
WHISTLE  
N95 OR SURGICAL MASKS  
MATCHES  
RAIN GEAR  
TOWELS  
WORK GLOVES  
TOOLS FOR SECURING YOUR HOME  
STURDY SHOES  
PLASTIC SHEETING  
DUCT TAPE  
SCISSORS  
HOUSEHOLD LIQUID BLEACH  
ENTERTAINMENT ITEMS  
BLANKETS OR SLEEPING BAGS

## NENDO

WATER  
PONCHO  
WHISTLE  
RADIO  
LANTERN  
HAND CRANK CHARGER

## FEMA

WATER  
NON-PERISHABLE FOOD  
BATTERY-POWERED RADIO  
HAND CRANK NOAA RADIO  
FLASHLIGHT  
EXTRA BATTERIES  
FIRST AID KIT  
WHISTLE TO SIGNAL FOR HELP  
DUST MASK  
PLASTIC SHEETING AND DUCT TAPE FOR SHELTER  
MOIST TOWELETTES  
GARBAGE BAGS FOR PERSONAL SANITATION  
WRENCH OR PLIERS  
MANUAL CAN OPENER  
LOCAL MAPS  
CELL PHONE WITH CHARGERS  
GLASSES  
INFANT FORMULA AND DIAPERS  
PET FOOD AND EXTRA WATER FOR YOUR PET  
CASH  
IMPORTANT DOCUMENTS IN WATERPROOF CONTAINER  
INSURANCE POLICIES  
IDENTIFICATION  
BANK ACCOUNT RECORDS  
EMERGENCY REFERENCE MATERIAL  
SLEEPING BAG OR WARM BLANKET  
COMPLETE CHANGE OF CLOTHING  
CHLORINE BLEACH AND MEDICINE DROPPER  
FIRE EXTINGUISHER  
MATCHES  
PERSONAL HYGIENE ITEMS  
MESS KITS  
PAPER CUPS, PLATES, PAPER TOWELS  
PAPER AND PENCIL  
BOOKS, GAMES, PUZZLES  
STERILE GLOVES  
STERILE DRESSINGS TO STOP BLEEDING  
CLEANSING SOAP  
ANTIBIOTIC TOWELETTES  
ANTIBIOTIC OINTMENT  
BURN OINTMENT  
ADHESIVE BANDAGES IN A VARIETY OF SIZES  
EYE WASH SOLUTION  
THERMOMETER  
PRESCRIPTION MEDICATIONS  
ASPIRIN OR NON-ASPIRIN PAIN RELIEVER  
ANTI-DIARRHEA MEDICATION  
LAXATIVE

## PREPPERS JOURNAL

CANNED VEGETABLES  
FRUITS AND MEAT  
HARD RED WINTER WHEAT  
RICE  
BEANS  
STAPLES  
FLOUR  
SALT  
SUGAR  
HONEY  
SPICES  
YEAST  
BAKING SODA  
BAKING POWDER  
POWDERED MILK  
VINEGAR  
**FREEZE DRIED FOOD**  
CANNING JARS  
PRESSURE CANNER  
WATER BATH CANNING POT  
WHAT TO USE TO PROTECT YOUR FAMILY  
IF A BAD GUY IS BEATING DOWN THE DOOR  
SEVERAL FIREARMS  
DOOR SECURITY  
EZ ARMOR DOOR SECURITY KIT  
SANDBAGS  
BARBWIRE  
CAMOUFLAGE CLOTHING  
BODY ARMOR EITHER SOFT OR HARD  
HEAVY DUTY KNIFE  
HOLSTER FOR PISTOL  
ULTRA BRIGHT FLASHLIGHT  
FOR FIREARMS ADDITIONAL AMMO  
FIREARM SAFE BOLTED TO THE FLOOR  
EXTRA WEAPON CLEANING SUPPLIES  
GUN OIL  
CLEANING SOLVENT  
PRECIOUS METALS –GOLD OR SILVER  
PAY OFF BILLS  
**SHELTER**  
CLOTHING  
APPROPRIATE OUTDOORS CLOTHING  
STURDY WORK BOOTS  
HEAVY DUTY SOCKS  
HEAVY DUTY GLOVES  
REPAIR MATERIALS IF NEEDED  
SPARE WOOD  
PLASTIC SHEETING  
DUCT TAPE  
NAILS  
TEMPORARY SHELTER  
CAMPING TENTS AND TARPS  
**BIVVY BAGS**  
HEAT SOURCE  
KEROSENE HEATER

WOOD BURNING STOVE  
PROPANE HEATER  
FUEL IN ABUNDANCE  
FIRE EXTINGUISHERS  
**HYGIENE**  
**FIRST AID KIT**  
SHAMPOO  
SOAP  
TOOTHPASTE  
COMB/BRUSH  
CLIPPERS  
FLOSS  
RAZORS  
VITAMINS  
FISH ANTIBIOTICS  
HAND SANITIZER  
**SUNSCREEN**  
CHAP-STICK  
FEMININE PRODUCTS  
ALCOHOL  
HYDROGEN PEROXIDE  
CALAMINE LOTION BENADRYL  
CHILDREN'S FEVER REDUCER  
NEOSPORIN OR FISH ANTIBIOTICS  
PLENTY OF BANDAGES  
**FACE-MASKS REGULAR AND N95**  
CAST IRON  
GAS GRILL  
CAMP STOVE  
ROCKET STOVE LIKE THE ECOZOOM  
FIRE PIT  
SOLAR OVEN  
SPARE PROPANE CYLINDERS  
DISPOSABLE LIGHTERS  
MANUAL CAN OPENER  
BUTANE STOVE  
CAST IRON COOKWARE  
DUTCH OVEN  
SKILLET  
RECHARGEABLE BATTERIES  
**BATTERY CHARGER SOLAR**  
VEHICLE ADAPTER  
1000 WATT INVERTER CONNECTED TO CAR  
BATTERY FOR CHARGING DEVICES  
SPARE FUEL TO RUN VEHICLE  
5 GALLON GAS CANS  
3000 W GENERATOR  
SPARE FUEL FOR GENERATOR  
14 GALLON GAS CANS  
100 WATT SOLAR PANEL KIT  
DEEP CYCLE BATTERIES  
SIPHON PUMP FOR ADDITIONAL FUEL  
LED FLASHLIGHT WITH SPARE BATTERIES  
BATTERY POWERED LANTERN  
**HEADLAMPS FOR EACH INDIVIDUAL**

PROPANE LANTERNS  
OIL LAMPS  
LAMP OIL  
HIGH QUALITY NON-GMO SEEDS.  
SHOVELS  
LARGE PRY BAR  
MED-LARGE BOLT CUTTERS  
PLASTIC ZIP TIES  
**PLASTIC BINS**  
CHAIN SAW  
HEAVY WORK GLOVES  
OILS AND LUBRICANTS  
WHEEL BARROW OR YARD WAGON  
CLAMPS  
FULL SET OF WRENCHES  
GOOD HAMMER  
RATCHET STRAPS  
BUNGEE CORDS  
HOES  
ROPE  
RAKE  
PRUNING SHEARS  
LOPPERS  
LIMB SAW  
HAND SAW  
PICK AXE OR MATTOCK  
POST HOLE DIGGER  
METAL TUBS  
FULL SET OF SCREWDRIVERS  
ALLEN WRENCHES  
PIPE WRENCH  
SPARE PVC AND PVC CEMENT  
GARDEN HOSE  
NAILS  
SCREWS  
SPARE LUMBER  
CHAIN  
SANITATION  
QUICK LIME  
BUCKET WITH TOILET LID  
TRASH BAGS  
HAND SANITIZER  
BLEACH  
CAMPING SHOWER  
**WORLD BAND RADIO**  
HAM RADIO  
ANTENNA  
BASE STATION SHORT WAVE RADIO  
SPARE BATTERIES  
SOLAR CHARGER  
ENTERTAINMENT  
BOOKS  
DVD ON BATTERY OPERATED PLAYER  
CARDS  
FRISBEE

## EXISTING SURVIVAL KIT

The available kits are very similar in a way. They address the same needs, water, food, communication and aid. There is a lack for shelter in almost every kit, with an emergency blanket or a poncho the only protection from the climate. It could be explained that they expect to cover the shelter problem with other solutions. The kits on the right page all resemble each other by being a kit in a bag assembled of existing products. The one that stands out is the Nendo Minimaid, left page, that is a more unobtrusive and have a considered design in terms of how it is perceived.





## TYPES OF SHELTER

Shelters span from simple to complex where some requires several tent poles, while others rely on inflated tubes to create the structure. Generally the heavier and more complex shelters are the more sturdy. Although more complicated and time consuming to set up.

### SIMPLE





## SHELTER PRIORITY

**Sun proof** to provide protection from sun, heat and rain.

**Clothes and blanket** to keep the immediate space around you warm.

**Waterproof** to keep the person dry.

**Ground Sheet** to prevent rising damp

**Wind proof** to create thermal buffer zone.

**Insulation** to trap air and reduce damp and moisture.

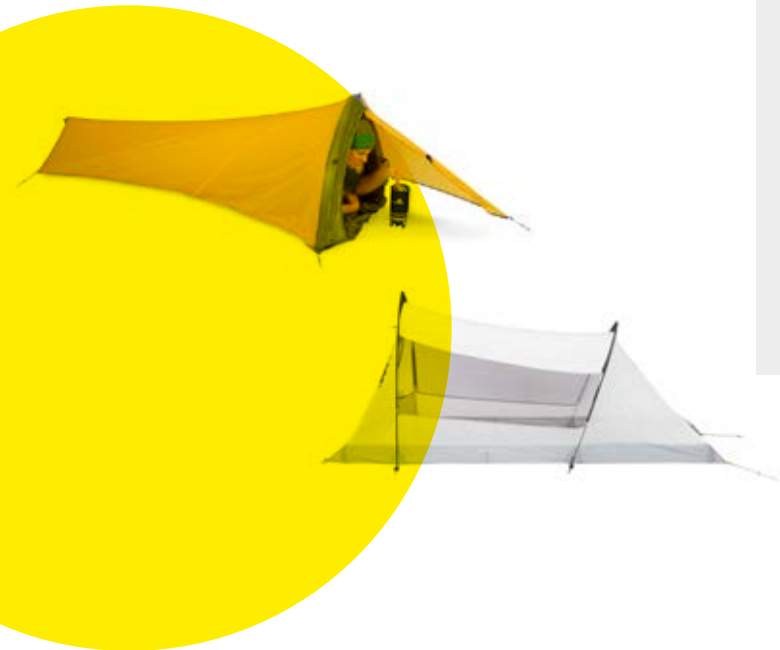
**Ventilation** to adjust temperature and allow air flow.

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<http://www.ifrc.org/PageFiles/95526/publications/D.03.a.07.%20IFRC%20shelter-kit-guidelines-EN-LR.pdf>

COMPLEX

125



224

## PONCHO/SLEEPING BAG

The kit should provide the needs that a poncho and a sleeping bag allows. As mentioned before if it is possible, every product in the kit can have more than one function. This resulted in us to combine the two. When evacuating or on the move, the poncho can give warmth and keep dry. When in the shelter, it can have the same function as a sleeping bag. The width of the poncho makes it suitable as a sleeping bag for one or as a duvet for two.





## FLASHLIGHT/LANTERN

A light source is needed for various reasons. No open fire is suitable since there is the danger of igniting natural gas, causing an explosion.

A flashlight that is ready to guide you if the earthquake happens during the night and if the power is out. As well as giving guidance, a light source is a comfort to use when in the shelter. To address both needs and make a flashlight and combined lantern. Making it available and easy access on the kit. A durable, flexible solution that can be recharged.

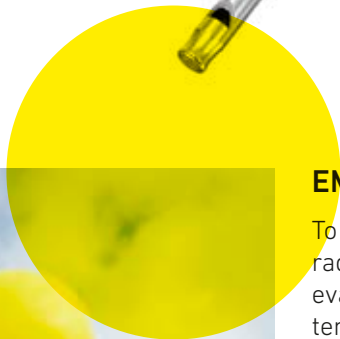




## HAND CRANK RADIO AND CHARGER

One of the hardest things to access during a power outage in disasters is information. No power means no broadcasts. Also the mobile networks simply clogs up or is out making you without the possibility to get information. A NOAA weather radio is a must in any disaster kit. It broadcasts warning and post-event information for all types of hazards. It can also charge USB-port devices such as the flashlight or a cellphone.





## EMERGENCY SIGNAL DEVICE

To signal for help with more options than the radio. For instance if stuck under rubble when evacuating a simple whistle can help attract attention. A helium inflated balloon is another low tech solution that can be attached to the shelter to make it more visible from a far.



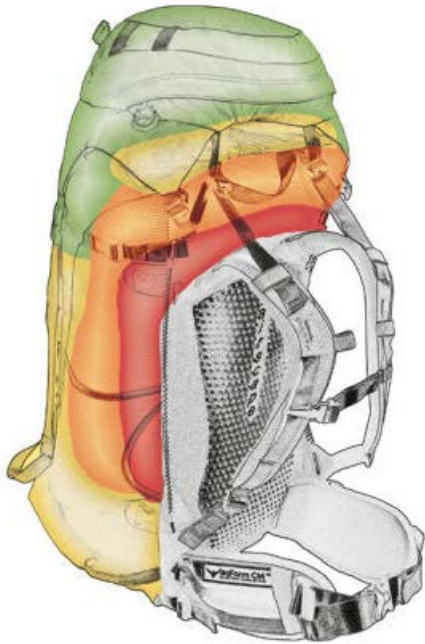
## **“STUPID” BACKPACK**

Distributing the weight as evenly as possible over the body makes a backpack suitable for carrying. It also leaves the hands free which could be important in an emergency situation.

How to position the weight in a backpack becomes important with increasing weight. We looked at existing backpacks to compare format, volume, compartments and ergonomic properties.

Backpacks span from complex, with many compartments and functions, to simple single compartment.





## WATER

The recommendation for most preparedness kit is to have around 3 litres per day. This covers drinking, cooking and sanitation. WHO states that 1-1.3 litres of drinking water per day is needed for survival in emergency situations.

How the water is prepared and packaged determines how long it can be stored. Pre packaged water sold as emergency supplies have a shelf life around 5 years.

## FOOD

To keep constant weight, a person needs somewhere between 1700 to 3200 kcal.

How the food is processed and packaged determines the expire date. Canned food are completely sterile and are safe to eat even up to 30 years but usually have an expiration date of 10 years. Freeze dried food usually have a lifespan of 5 to 7 years.

## PACKAGING

Different types of packaging have advantages and disadvantages. Tin cans keep food safe to eat for a long time but they are bulky and heavy compared with freeze dried food packaging.

There is also difference in the waste volume of different packagings, where stiff packagings take up the same amount of space after being consumed, where soft packagings can be compressed.

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[http://www.who.int/water\\_sanitation\\_health/publications/2011/tn9\\_how\\_much\\_water\\_en.pdf](http://www.who.int/water_sanitation_health/publications/2011/tn9_how_much_water_en.pdf)

<http://www.livsmedelsverket.se/livsmedel-och-innehall/naringsamne/energi-kalorier/>

<http://lifehacker.com/this-chart-compares-types-of-emergency-foods-best-for-y-1719525270>



## ***MATERIAL RESEARCH***

By comparing qualities and weaknesses of different fabrics and materials we were able to understand possibilities and limitations when making a earthquake kit. It also helped us to find retailers and form an idea of what the costs of production would be.







**Tyvek®**

Non-woven fabric  
 45-108g per sq. m  
 Water resistant  
 High tear strength  
 Biodegradable  
 Cheap  
 Comes in white, can be coloured, printed on the fabric



**Cuben fiber®**

Non-woven fabric  
 18g per sq. m  
 Water proof  
 High tear strength  
 Expensive  
 Comes in white, can be coloured  
 Hard to sew in



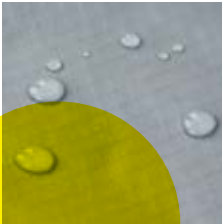
**Vinyl coated nylon**

Reinforced vinyl fabric  
 100g+ per sq. m  
 Water proof  
 High tear strength but brittle  
 Cheap  
 Comes in all colours



**TPU coated nylon**

Woven coated fabric  
 100g+ per sq. m  
 Water proof  
 High tear strength  
 Cheap  
 Comes in all colours



### **Ripstop Nylon**

Woven fabric

30-100g per sq. m

Water resistant, can be made waterproof

High tear strength

Comes in all colours



### **Silnylon**

Woven fabric

25-40g per sq. m

Water proof

High tear strength

Expensive

Comes in all colours



### **eVent®**

Layered membrane fabric

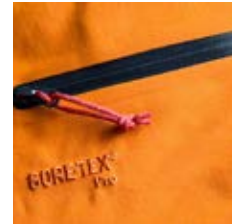
>45g per sq. m

Waterproof one way, breathing

Comes in all colours

Membrane easily damaged

Expensive



### **Goretex®**

Layered membrane fabric

>50-70g per sq. m

Waterproof one way, breathing

Expensive

Comes in all colours

Membrane fragile



**Glassfiber tent poles**

Cheap  
Brittle



**Aluminium tent poles**

Lightweight  
Durable



**Noomex®**

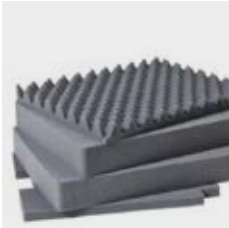
Honeycomb flexible insulation  
Fireproof  
Durable  
Expensive



**3D Nylon mesh**

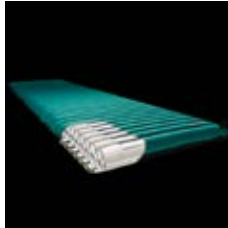
Flexible  
Insulating  
Durable  
Cheap  
Lightweight





### **Foam PU**

Flexible  
Insulating  
Cheap  
Lightweight  
Easily compressed



### **Tube inflated system**

Flexible to stiff  
Insulating  
Comfortable  
Lightweight  
Broad price range



### **Memory foam**

Adapts to body  
Heavy  
Hard to compress  
Expensive



### **Self inflating mattress**

Adapts to body  
Lightweight  
Easy to compress  
Can be made cheap

**Standard peg****Hard ground peg****H - peg****Spiral peg****V - peg**

## TENT PEGS

In an earthquake scenario it might be problematic to find flat and even ground as well as possibilities to anchor a shelter to the ground. Therefore we looked into different types of anchoring techniques for tents. There is a multitude of tent stakes designed for different types of ground.



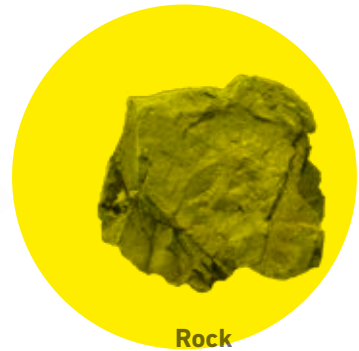
Y - peg



U - peg



Sand peg



Rock

## ALTERNATIVE ATTACHMENTS

Reading on several outdoor forums and guides many people use existing structures such as trees and rocks to anchor their tents especially when putting up the tent in rocky terrain.

## ***GRAB BAG ANALYSIS***

After choosing concept and doing additional research we wanted to further understand what our grab bag contains and what it needs to address. We structure our ideas and specify the grab bag more in detail to forward the project.





### NENDO MINIM+AID

Earthquake survival kit that contains a poncho, radio, lantern, whistle and water.



### RCA WEARABLE SHELTER

A Tyvek coat for refugees that transforms into a tent or a sleeping bag.





## GENERIC SURVIVAL KIT

A 72 hour survival kit that is an assembly of existing products.



## IKEA FOUNDATION/UNHCR SHELTER

A flatpack, light weight, modular emergency shelter. It meets the basic needs for the activities of basic living, for privacy, security and familiarity.

## MOVE, COMMUNICATE, LIVE, SLEEP

The kit addresses specific needs in different areas. We divided needs in four categories after when the needs are addressed. Move refers to the time before and in between camp is set. Communicate on how to get and share information. Live is the hours when the user is active and awake. Sleep refers to the needs that we address to enable the user to sleep in the shelter.

MOVE



COMMUNICATE



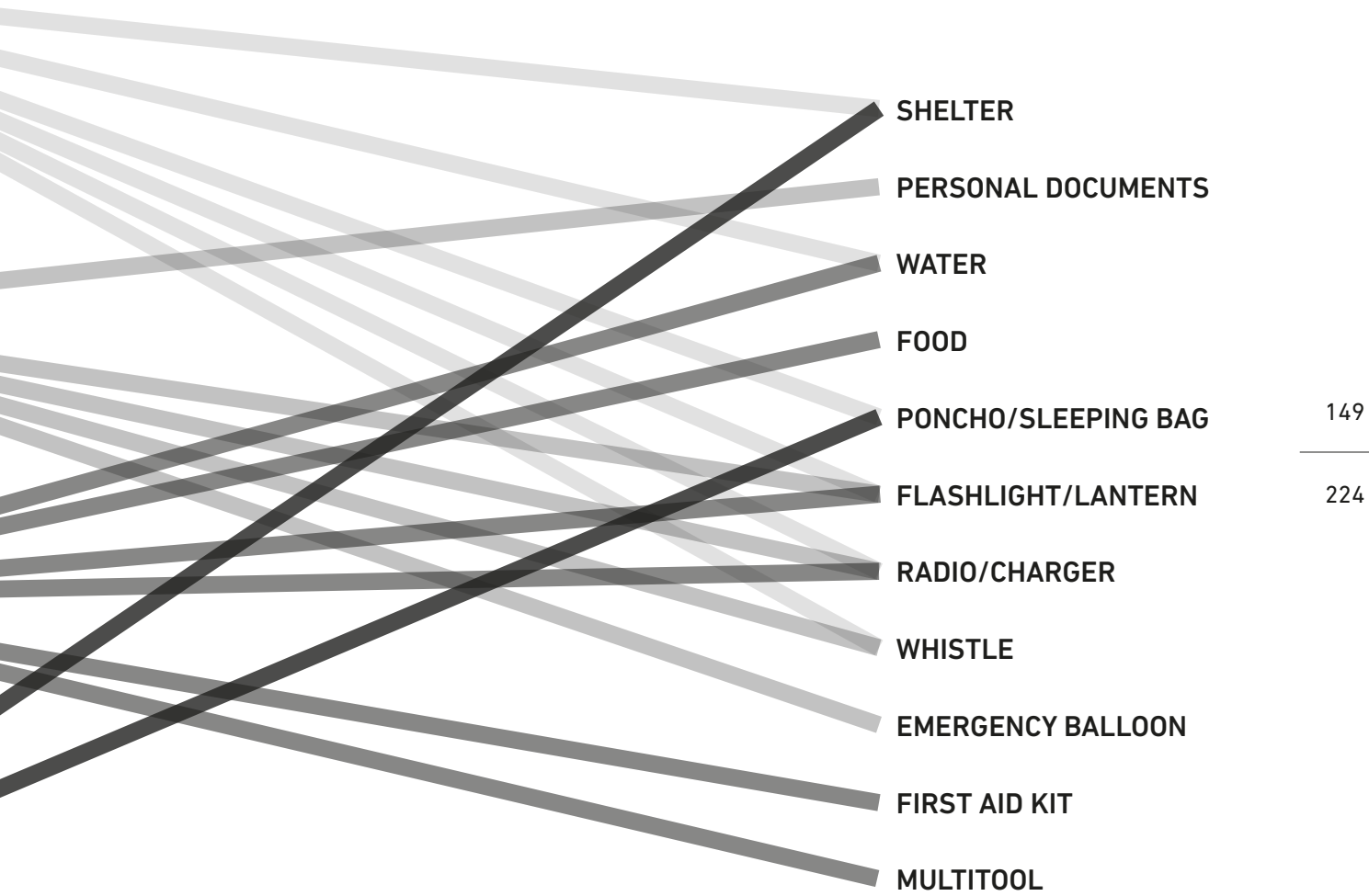
LIVE



SLEEP

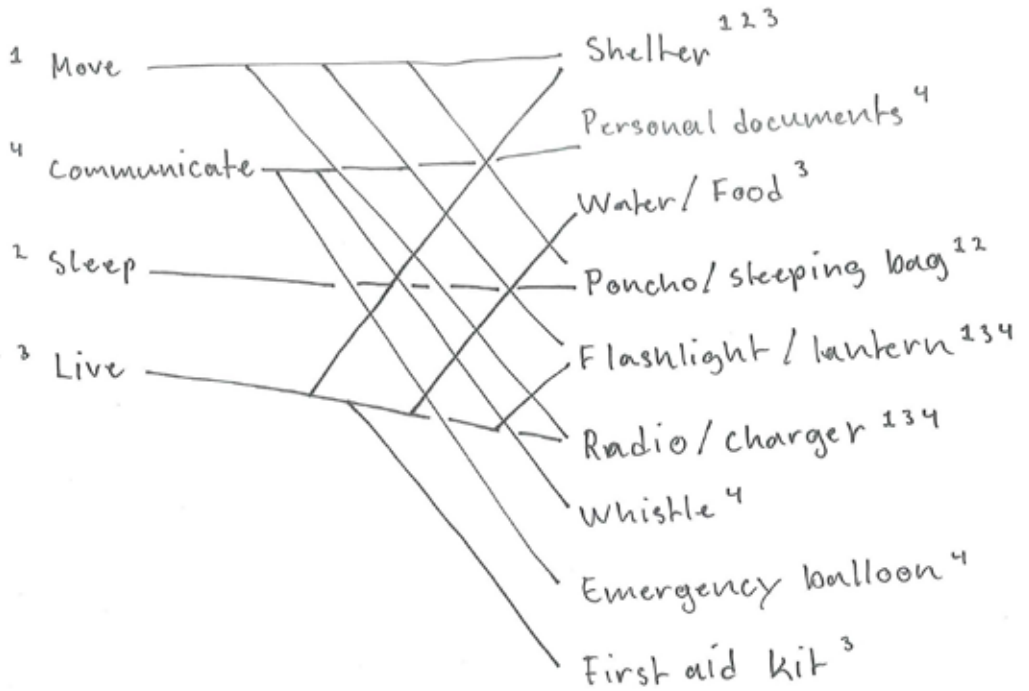






# Functional analysis

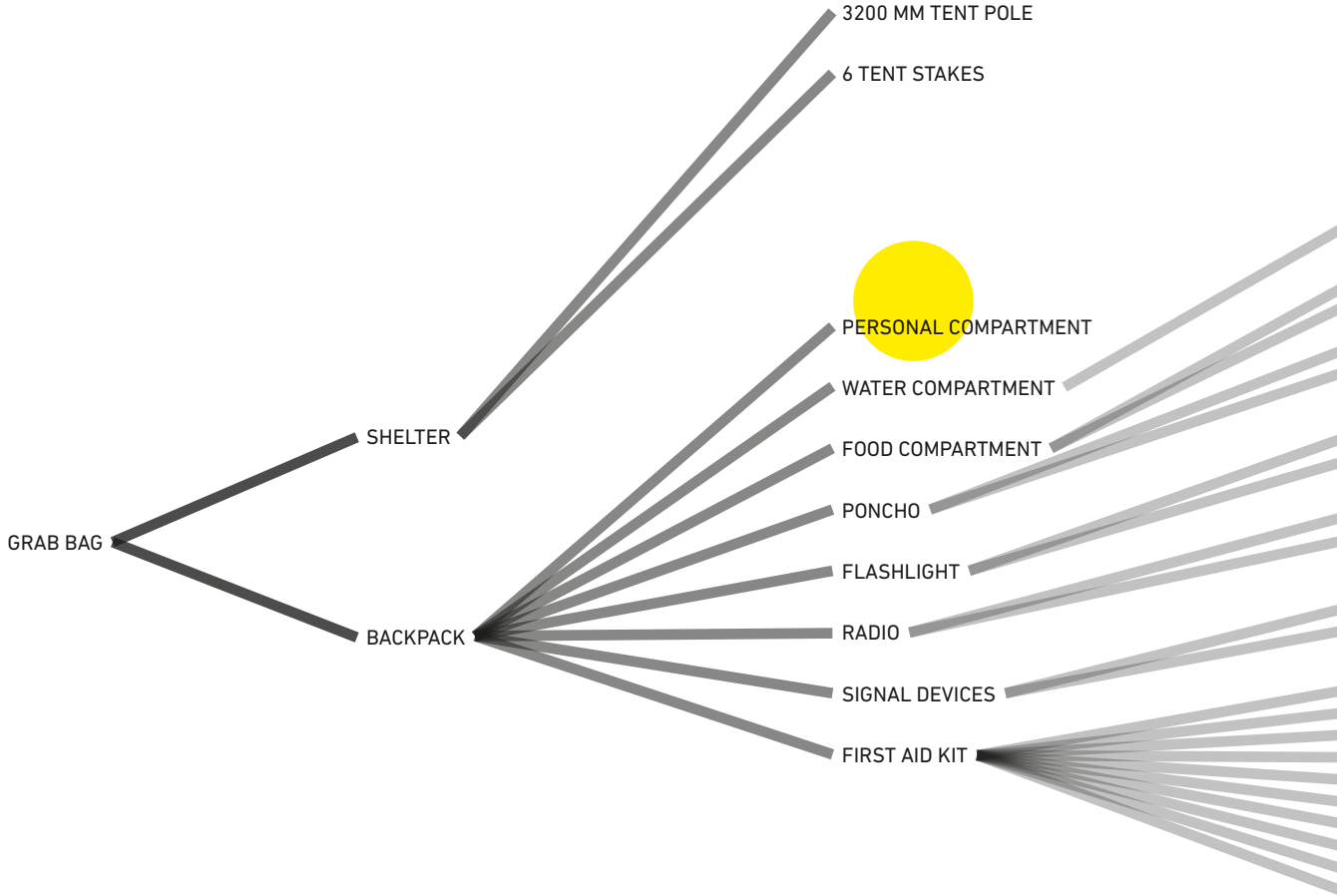
## Need





GRAB BAG ANALYSIS

SYSTEM ANALYSIS





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## LIMITATIONS

Our focal point is the first 72 hours after which it can be assumed that aid arrives to the disaster area. We wanted to create a kit that could last longer than this time frame due to the fact that many people can't count on receiving sufficient protection.

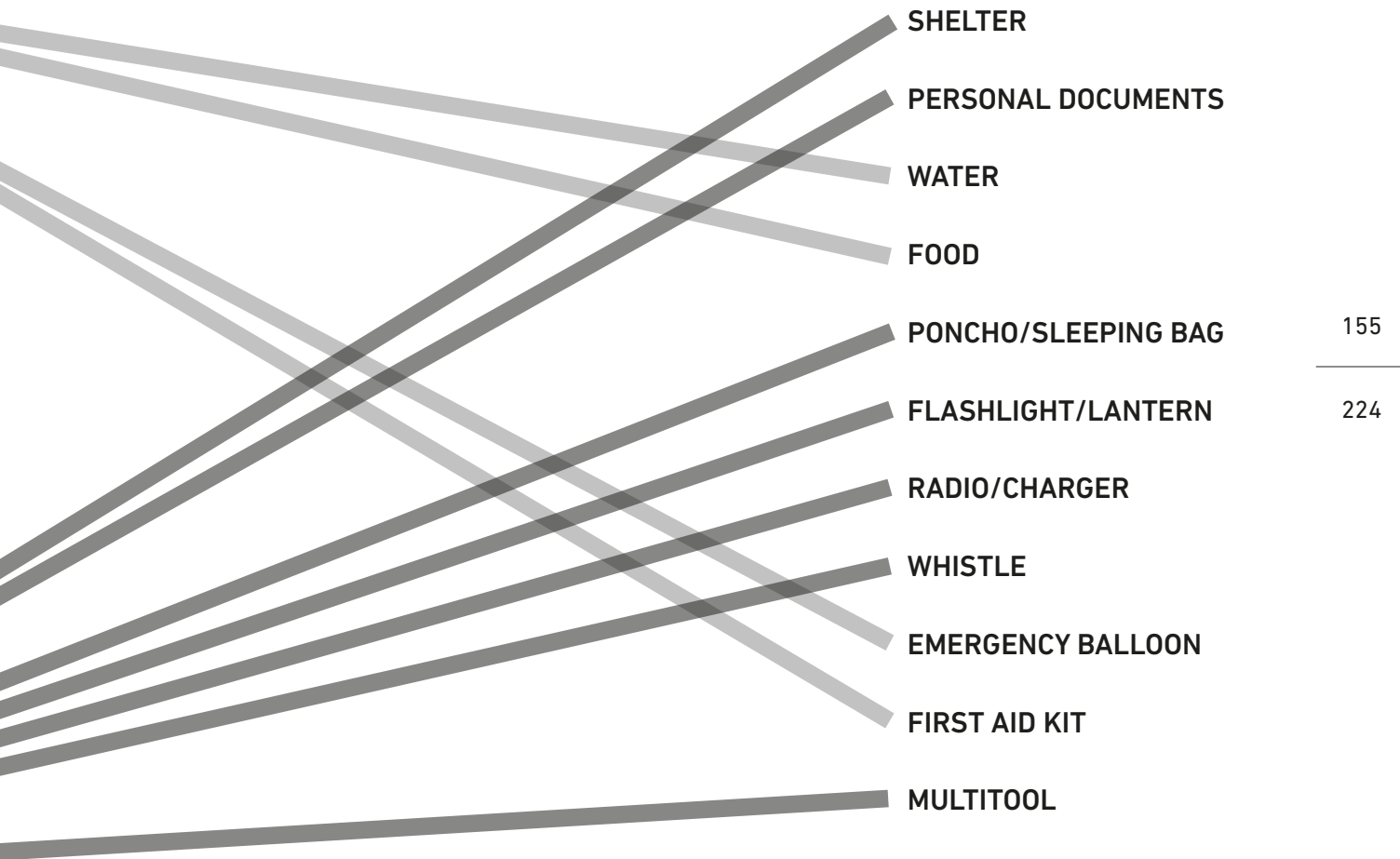
The problem with extending the lifespan for the entire grab bag and content is that food and water becomes very heavy and is usually the top priority for aid organisations. Therefore we thought it reasonable to differentiate components in the grab bag after expected lifespan, consumables and non-consumables.

**CONSUMABLES**



**NON-CONSUMABLES**





### WHAT TAKES UP SPACE?

Making volume mock-ups for the components of the grab bag kit gives a sense of the size of the backpack. Food and water takes up most of the space as well as the weight.



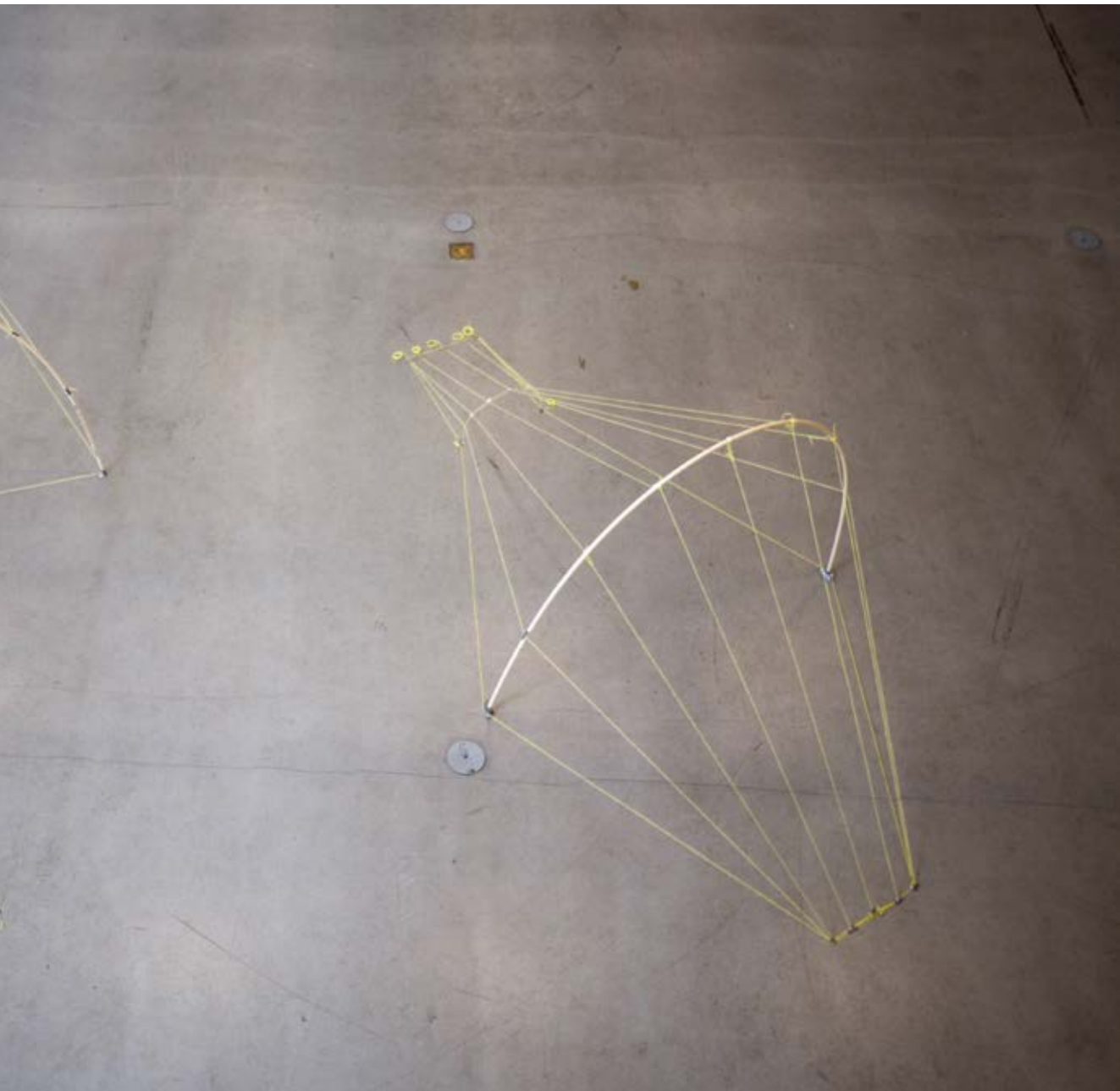




## ***GRAB BAG IDEATION***

In the second ideation we use models as a tool to explore volume, function and form. Sketching is used as a tool for communicating with each other and to test new ideas before making models. Making physical models have been helpful to understand and solve problems that would have been hard to address with sketches and 3D-modeling





## IDEATION THROUGH MODELS

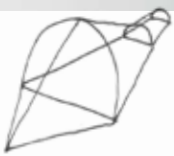
We started out in small scale to visualise shelter concepts. We wanted to achieve a simple form that was easy to manufacture but still provide sufficient protection against elements and have a comfortable size. An early idea was to make the shelter modular so that a family could combine their individual shelters.





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## FUNNEL SHELTER

This design was simple to manufacture and would enable two people to sleep in the tent because the funnel shape follows the shape of the body and provides more space around the upper body which allows for moving around and gives a little more personal space.





## SPACIOUS SHELTER

Placing the tent arch in the middle of the tent provides more head space but makes the design more complicated and uses more fabric.



## PONCHO SHELTER

Making the tent functioning as a poncho reduces the material otherwise used for a separate poncho. The problem with this idea was to solve how to get the poncho over the body without pulling up the whole tent and also to make sure the tent don't get wet on the inside.



### QUICK IN AND OUT

After surviving an earthquake there is a risk for aftershocks, mass panic and confusion might arise. It might be important to be able to move quickly, according to new information on emergency broadcasts. Making the shelter easy to set up and take down enables the user to respond quickly to such information.







Our idea was to make the end of the shelter the bag used for stuffing down the fabric in.

Reducing the amount of anchoring points was also part of making the shelter quick and easy to set up and take down. The anchoring line in the front could be used to pull out the shelter.



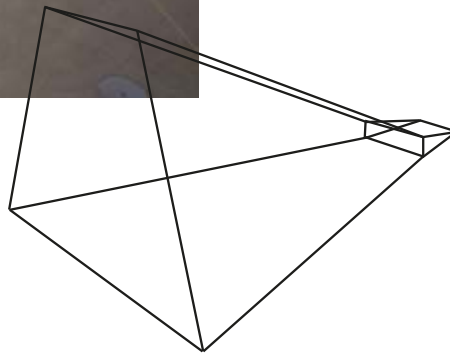
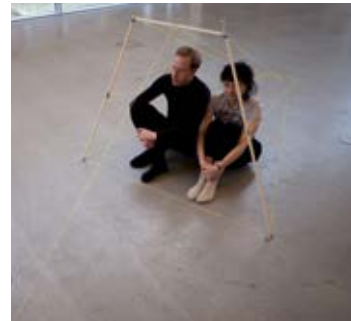
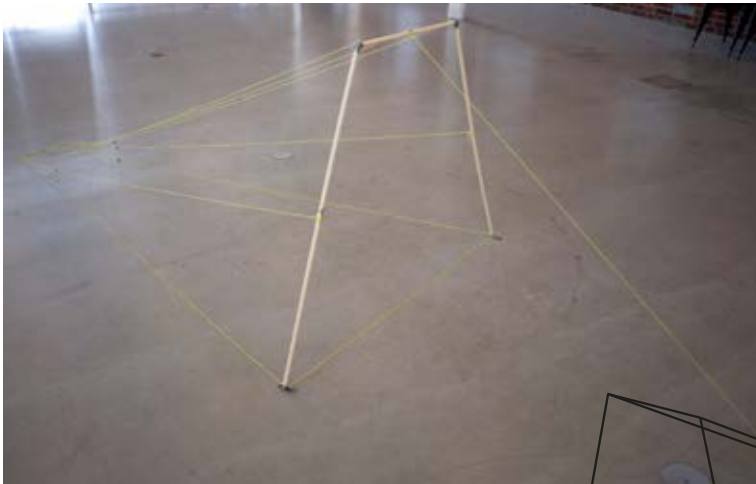


OPTIMAL FOR ONE, GOOD FOR TWO



## SLEEP + LIVE SHELTER

The volume is optimal for one person but can accommodate two persons with ease. Being able to sit comfortably, change clothes and create a private space allows a more dignified life after an earthquake. This was addressed by adding height where it is needed and possible with one arch.



## GOING FULL SCALE

We made a full scale model of the funnel shelter with the bag end to further evaluate the concept and understand how the fabric would behave when setting it up and taking it down.



Put in two tent stakes to secure the bag



Thread the tent pole through the tube in the front



Secure the groundsheet with tent stakes



Pull the front anchor line



Pull until the entire shelter is stretched out



Secure the anchor line and stretch the tent

## EVALUATION

Here we realised that if the fabric is just tucked into the bag it ends up in the bottom and becomes a volume that is hard to control.

It also showed a problem to stretch the fabric when the bag lacked structure.

## IMPROVEMENT

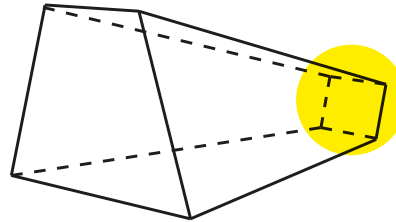
Adding a structure at the back made it easier to stretch the shelter fabric and achieve desired volume.



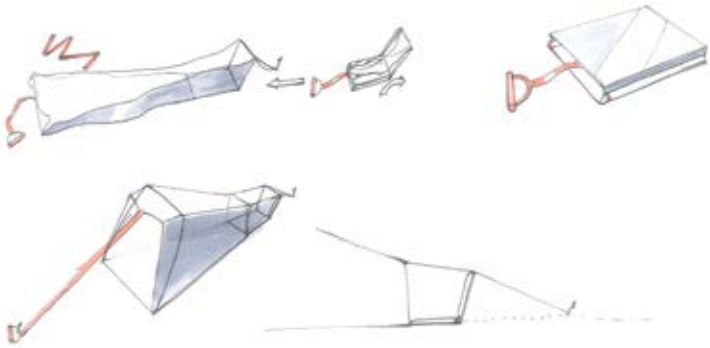


## BACKPLATE

The structure at the back made us realise that having the extra length of the bag did not add anything. Instead a backplate works both as a structure and makes up one side of the shelter bag.



GRAB BAG IDEATION



SHELTER REFINEMENT







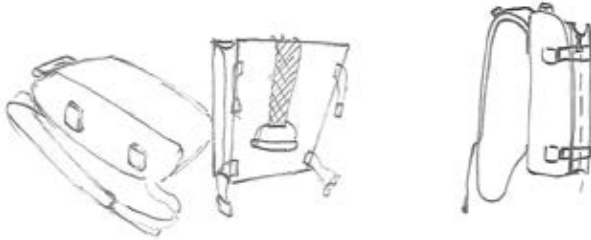
173

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### **EASIER SET-UP**

The backplate allows for just one anchor point at the back. The front reinforces the structure with two anchor lines.



## ONE PRODUCT

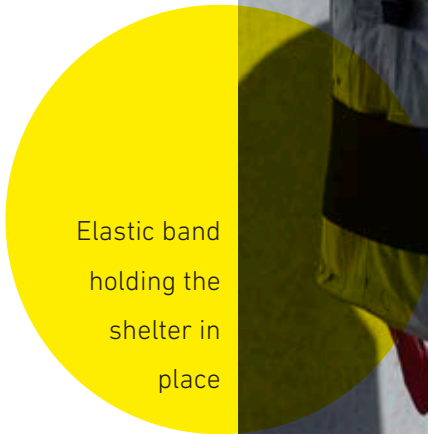
Our goal was to make the grab bag feel like one product. This makes integration of different components an important task. By assigning the shelter a logical position on the backpack we want to achieve a solution that is intuitive to use yet have a unison visual expression.

1 + 1 = 1

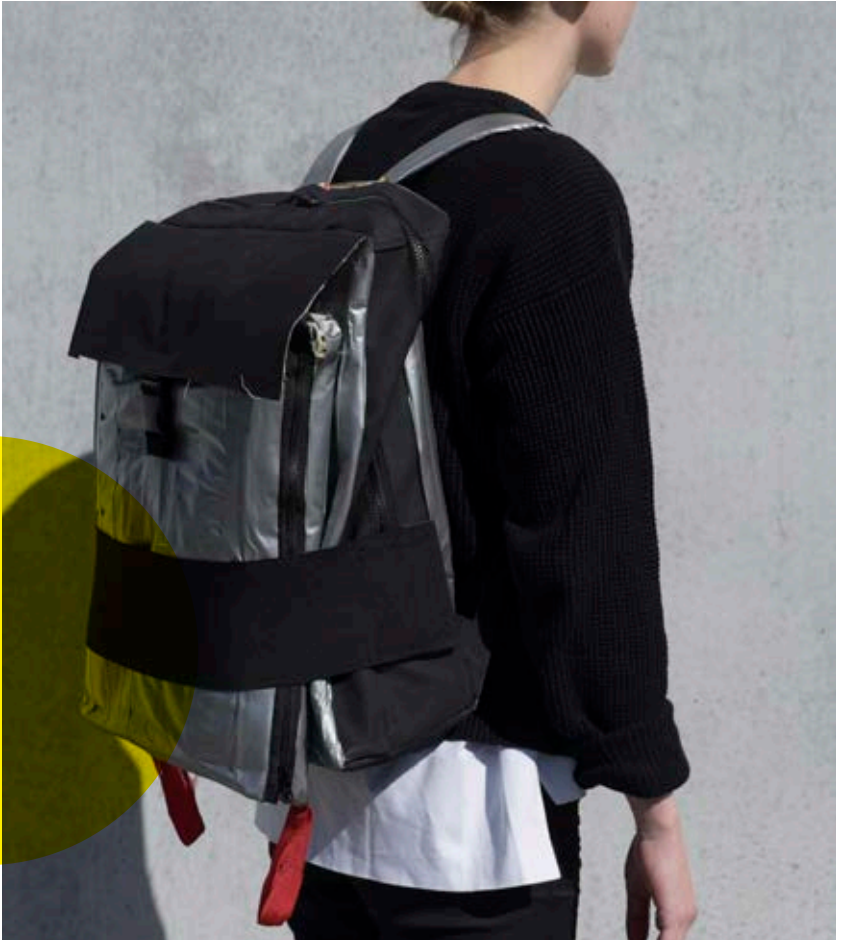




Personal compartment



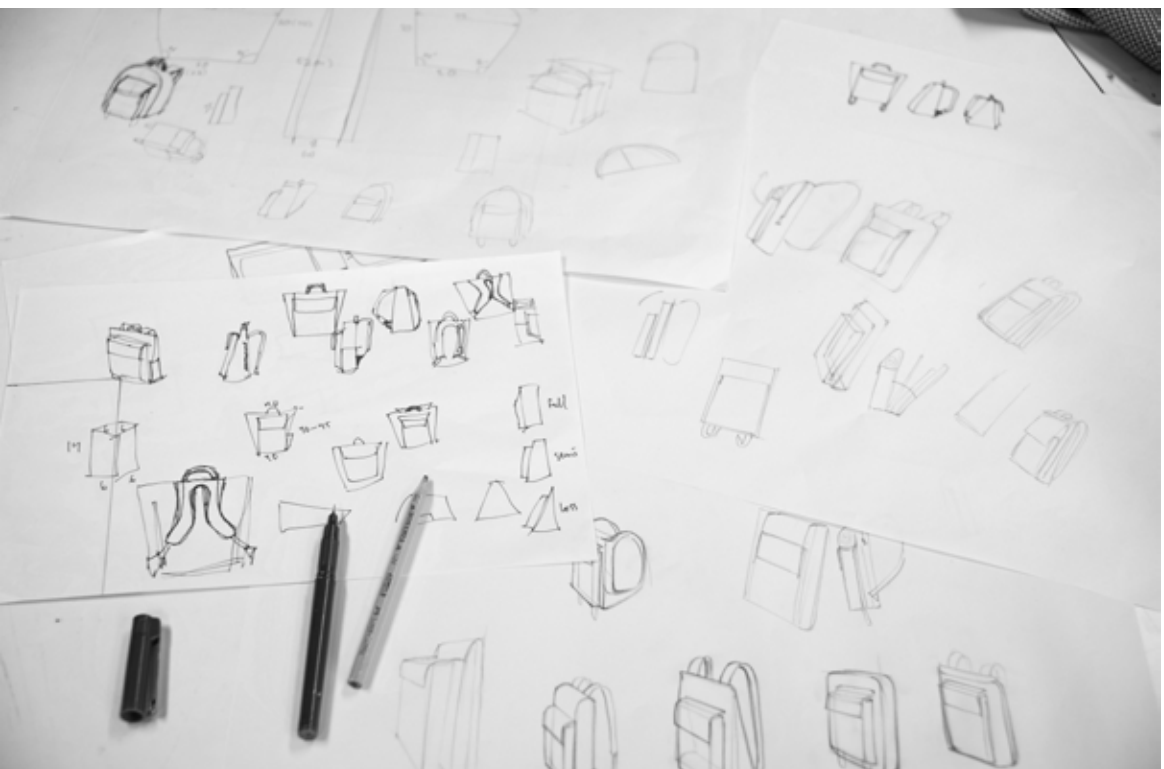
Elastic band  
holding the  
shelter in  
place





Top patch covers the shelter



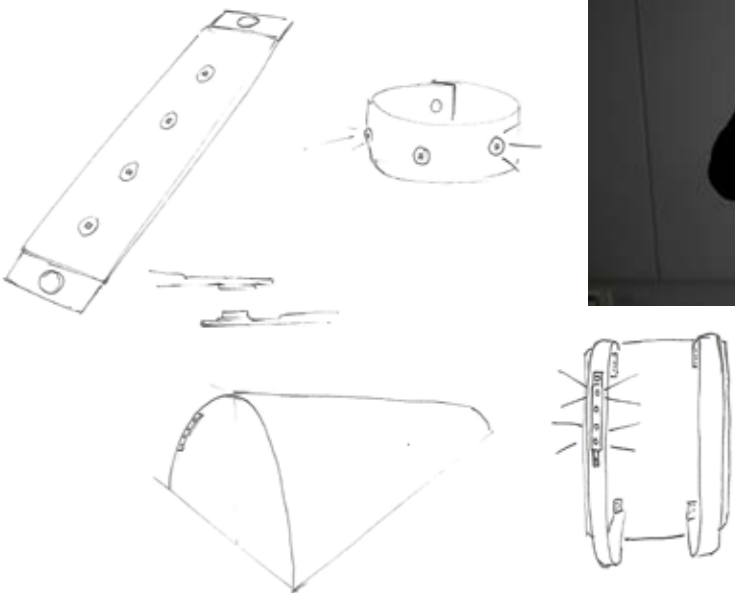


GRAB BAG IDEATION

SHELTER+BACKPACK



Velcro



GRAB BAG IDEATION

SHELTER + BACKPACK + FLASHLIGHT





## VERSATILE FLASHLIGHT

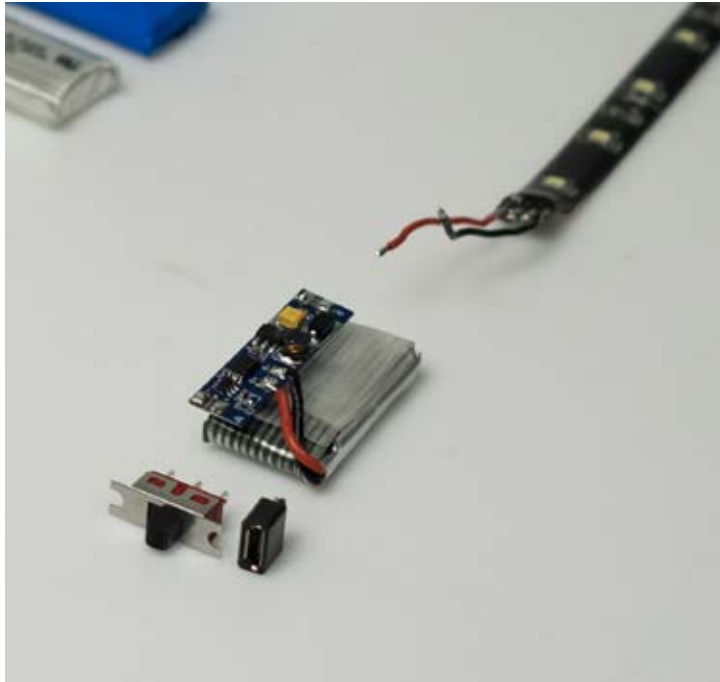
We visualised the flashlight as a flexible strip that could be used both as navigational light when attached to the backpack or hand held and as a lantern that could be positioned inside the tent.

To make the light energy efficient yet strong we tried different types of LEDs. Different lithium ion batteries was tried as power sources and benchmarked. We needed to provide light for a sufficient period of time for the user to navigate out of a building without power and get to a safe place. That means anywhere from 1 minute up to several hours.



GRAB BAG IDEATION

SHELTER + BACKPACK + FLASHLIGHT



## FLASHLIGHT SPECIFICATIONS

We decided upon components that would allow for 5 hours of light and had the form factor that was required to make the concept work. Ideally we would have components that allowed to set different strength of the light. Having a standby indication is also desirable to find the backpack in case of a blackout.

12 LED strip of 100 lumen

450mAh li-ion rechargeable battery

USB charge port

LED driver 5v

## PONCHO

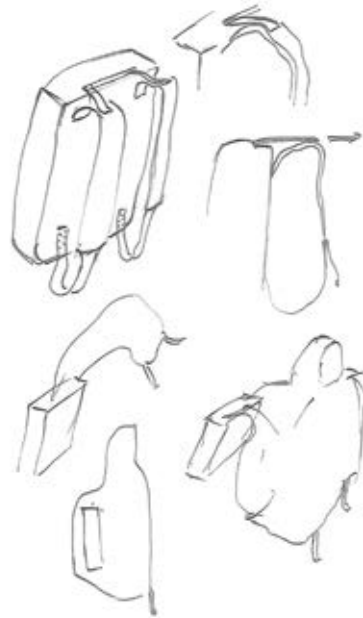
The poncho might be needed on the move and therefore we had it as a priority to make it easily assessable.

It needs to protect it's user from the elements, this could be both rain or blasting sun. The poncho could also double as a sleeping bag with it's insulating properties.

Turtle neck



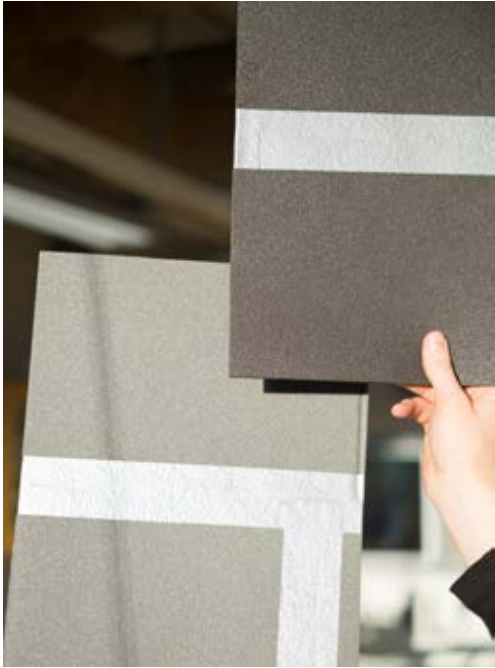
Hidden hood





GRAB BAG IDEATION

MATERIAL SELECTION



## FABRICS EVALUATION

Trying to find functional materials we were left with no other option than ordering online where our material know-how could only lead us to estimated guesses. We therefore reasoned that it would be good to keep to neutral grey scale since the grab bag had to blend into the home environment.

We ordered an selection of materials to be able to choose after getting to feel their physical properties.

The silver rip-stop nylon would suit the shelter and poncho good because of its reflective properties. It could work in the same way as emergency blankets, reflecting heat away or keeping it in.

The backpack would consist of multiple fabrics and materials and we reasoned that black would be easier to match than various greys.



## MANUFACTURING

Not all design decisions could be made on paper or in our heads. Being the first time we worked with fabric in this way we came to valuable conclusions while manufacturing the backpack, poncho and shelter.

It was important for us to deliver a final model that was both functional and of high aesthetic quality.







# ***LIFEHOUSE***

## **EARTHQUAKE SURVIVAL KIT**

Lifehouse is an earthquake survival kit. Containing everything you need when forced to evacuate. The kit is an unobtrusive solution for the home environment and the prepared individual.







## GRAB BAG

Containing every thing you need when forced to evacuate in an earthquake the grab bag is an unobtrusive solution for the prepared individual.

Manufactured in black Cordura for durability and waterproofing. A hidden compartment ensures that the user can store and bring personal belongings. The backpack is top-loaded and compartmentalised to ensure that the weight is distributed evenly.





RESULT

LIFEHOUSE EARTHQUAKE SURVIVAL KIT



## **FLASHLIGHT**

A light source that provides guidance when evacuating. Detachable from the shoulder strap it is versatile in its usage. The LED flashlight can be charged with the hand crank radio.



## PONCHO

The reflecting ripstop poncho protects from the climate, whether it is blazing sun, rain or wind. Padded with ultra light thermal insulation it can transform into a sleeping bag for one person or a blanket for two.







RESULT

LIFEHOUSE EARTHQUAKE SURVIVAL KIT



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RESULT

LIFEHOUSE EARTHQUAKE SURVIVAL KIT



## SHELTER

The Lifehouse shelter is suited for the scenario of earthquake displacement and the need for moveability. It is as easy to set-up as to take down. It provides protection from the climate and offers a private space. The shelter is optimised for one but can cater for two persons.





RESULT

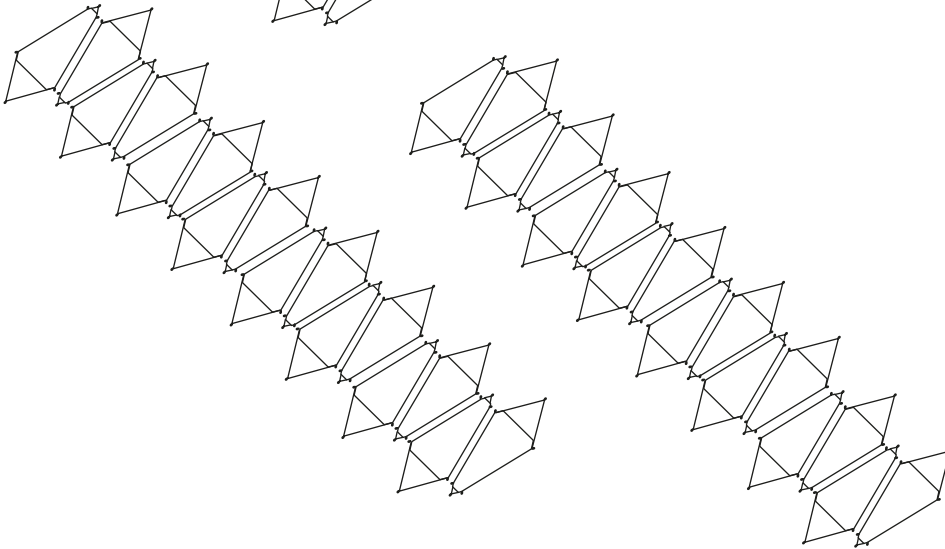
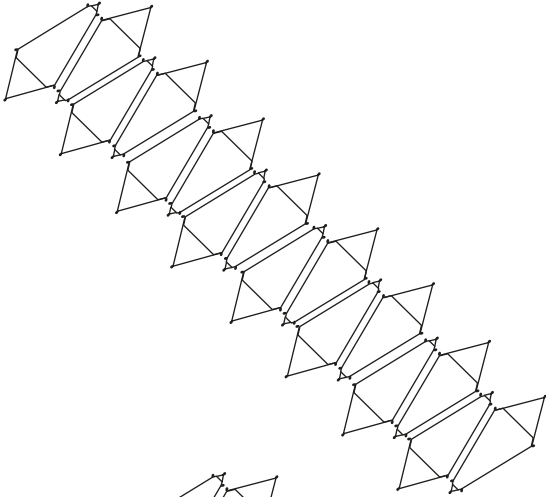
LIFEHOUSE EARTHQUAKE SURVIVAL KIT





## SETUP

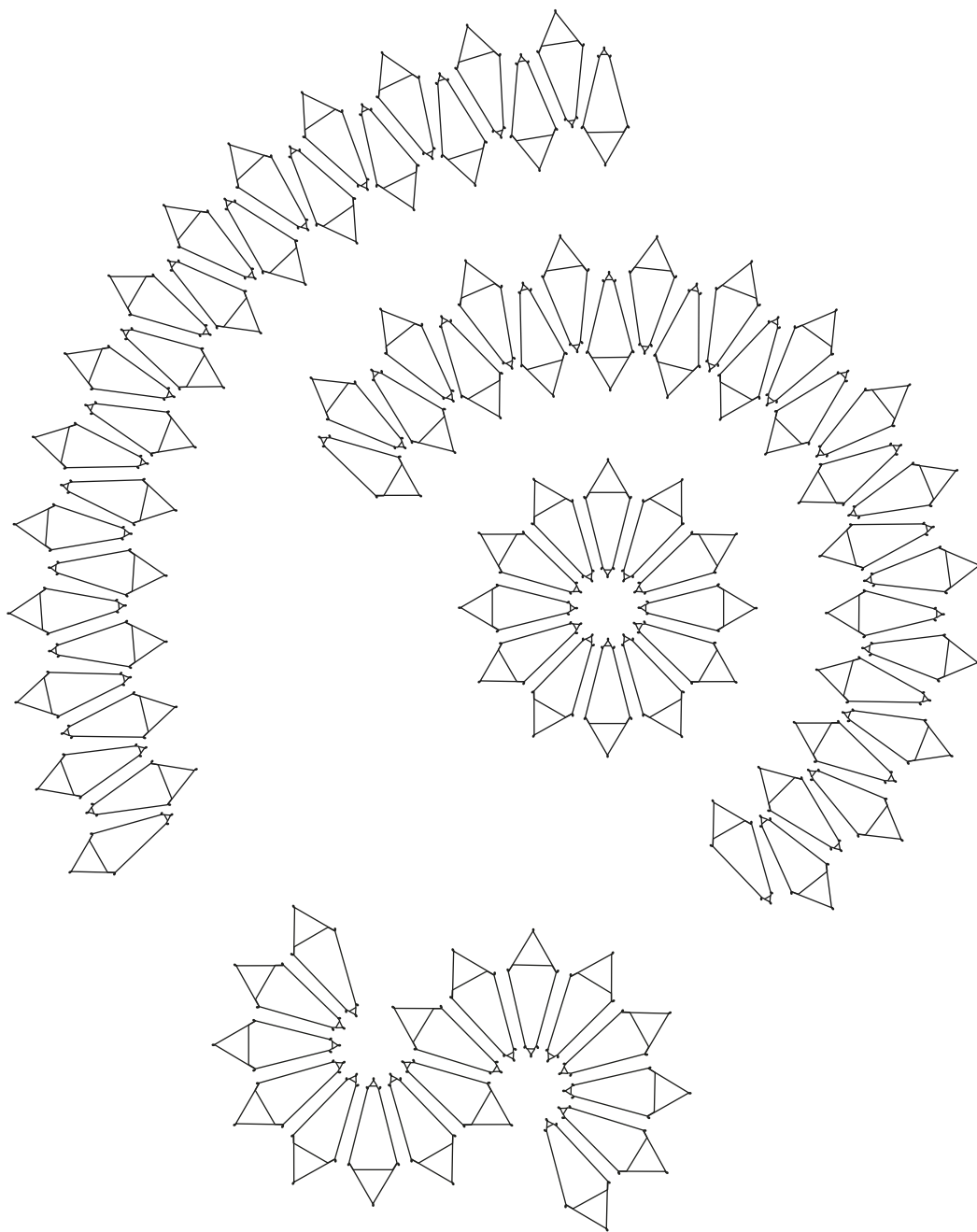
The Lifehouse shelter module can be set up in about 1 minute. Taking down the shelter takes roughly the same time. With only 6 anchor points in the ground the shelter is forgiving to put up even for inexperienced users.



### CAMP SHELTER SETUP

The Lifehouse shelter can be combined to be space efficient in a camp situation either to form lines or in a circular patterns.







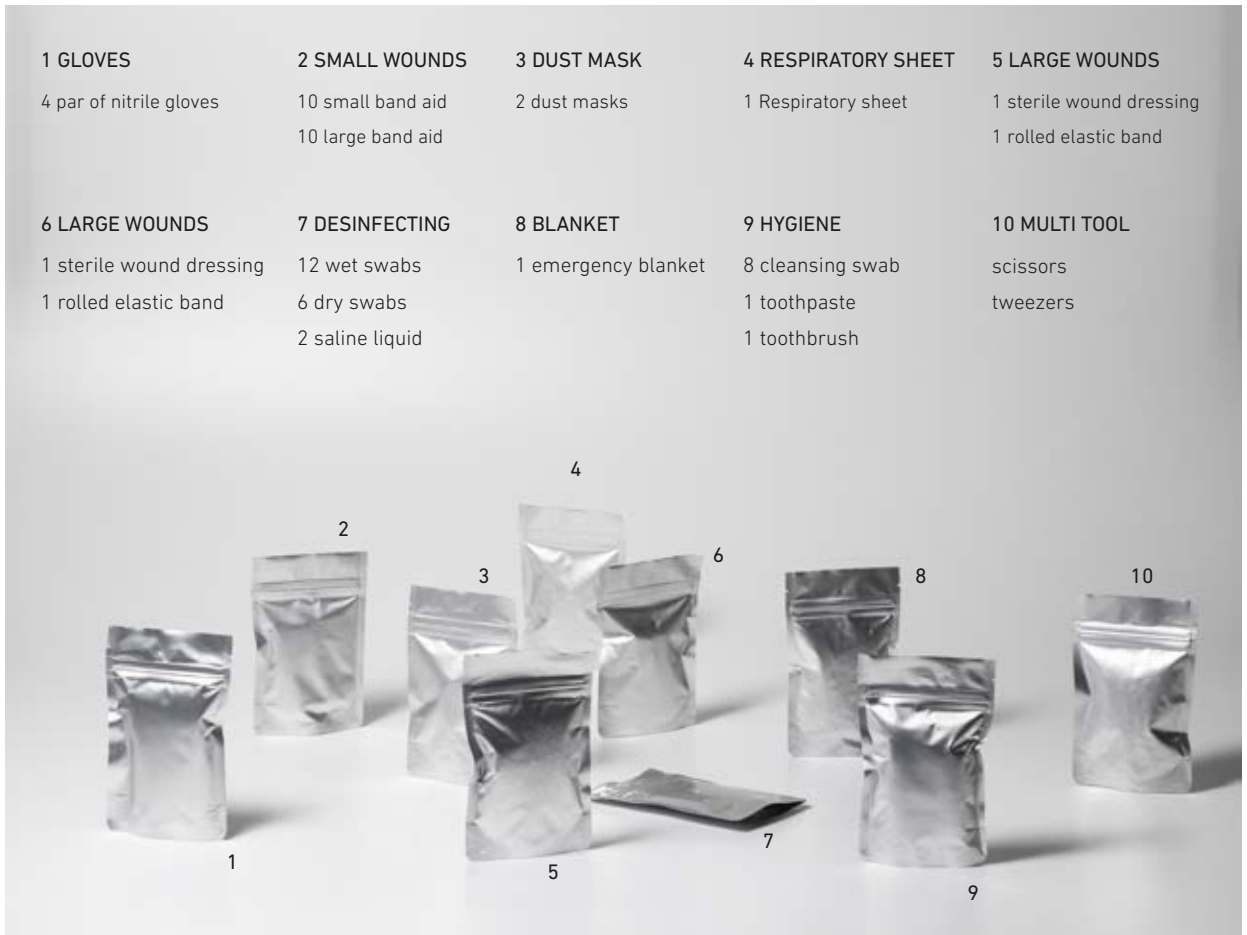
## WATER

Water comes in pre packaged in 330 ml containers, 3 per day. It's divided in smaller portions to help ration the water evenly to keep hydrated. The packaging is resealable and can easily be refilled when opportunity is given.



## **MEALS READY TO EAT**

Lifehouse is delivered with ready to eat meals with a shelf life of 10–15 years. The food consists of 2 larger meals per day and one snack.



## FIRST AID KIT

The aid kit is divided in packages corresponding to needs for different cases of aid. This is to make it easier to find what is needed, especially in a stressful situation.



## **EMERGENCY BALLOON**

The self inflating latex balloon is used to signal position and the need for help. It's an analogue way to communicate and can be useful in emergency situations for both rescue personnel and user.

RESULT

LIFEHOUSE EARTHQUAKE SURVIVAL KIT





## ***LIFEHOUSE***

### **EARTHQUAKE SURVIVAL KIT**

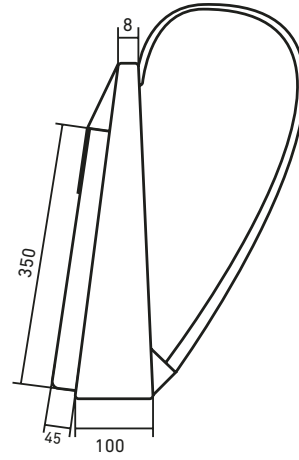
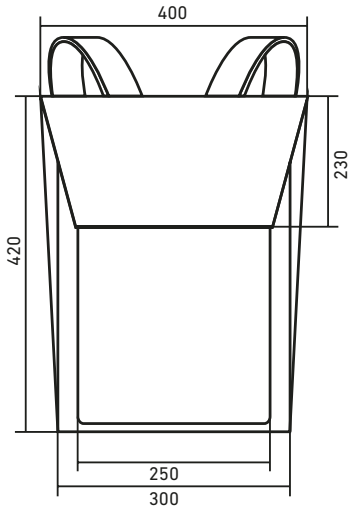
When evacuating the home in an earthquake, Lifehouse is a reassurance that in one backpack the essential needs for 72hours are covered. Weighing only 8kg the Lifehouse will enable the user to move around, communicate and quickly respond to new information.

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[mm]



RESULT

LIFEHOUSE EARTHQUAKE SURVIVAL KIT

COLOUR





## **BACKPACK MATERIALS**

Shell - Cordura 1000D with PU-coating on one side, hydrostatic head minimum 1000mm

Lining - 70D nylon fabric with PU-coating on one side, C6 impregnation, hydrostatic head 6000mm, 76g/m<sup>2</sup>

Structural - Closed cell foam 8mm

Straps - 25mm polyamid webbing, 1.8 mm thick, 1100 daN tear strength 30g/m

Velcro - 25mm and 50mm wide

Zippers - YKK Aquaguard Vislon 5VT, waterrepellent zippers, bicolored

Buckles - Nylon ladder-locks for 25mm webbing

## **SHELTER MATERIALS**

Shell - Flame retardant ripstop nylon 70D with reflective silver coating, hydrostatic head 6000mm, 56g/m<sup>2</sup>

Groundsheet - 70D nylon fabric with PU-coating on one side, C6 impregnation, hydrostatic head 10000mm, 90g/m<sup>2</sup>

Anchor lines - 3mm reflective polyester cord with dyneema-core, 420 daN tear strength, 5g/m

Groundsheet straps - 25mm polyamid webbing, 1.8 mm thick, 1100 daN tear strength 30g/m

Backplate - Perforated 3mm thick aluminium sheet, 250mm wide and 350mm high, 245g

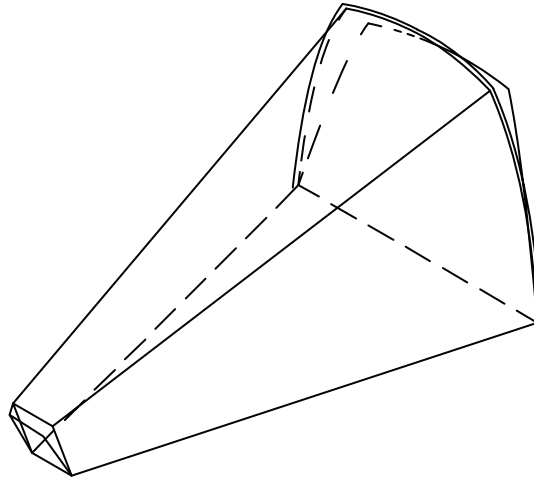
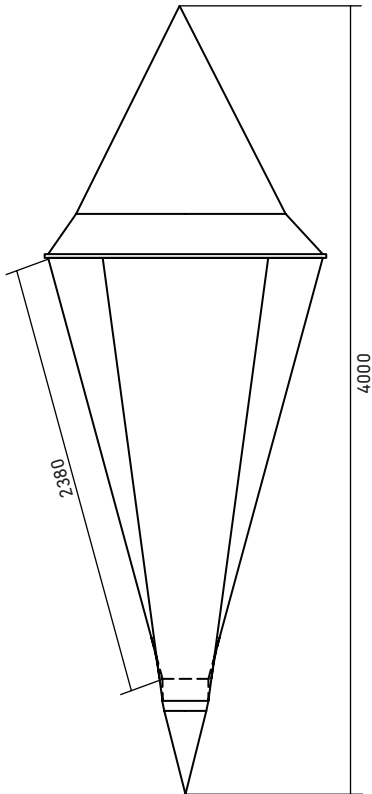
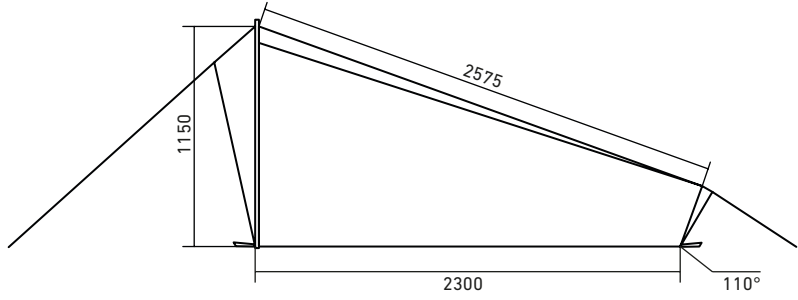
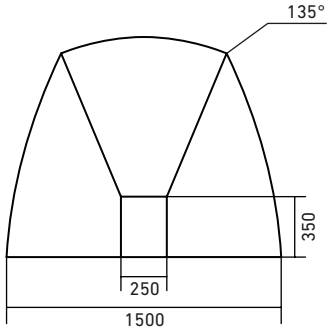
Tent arch - 11 aluminium tube sections of 8.5mm diameter and 290mm long, held together by elastic chord, total weight 145g

Eyelets - Aluminium 8mm diameter

Tent stakes - 6 aluminium Y-profile stakes 150mm long, 10g/piece

Zipppers - YKK Aquaguard Vislon 5VT, waterrepellent zippers

[mm]



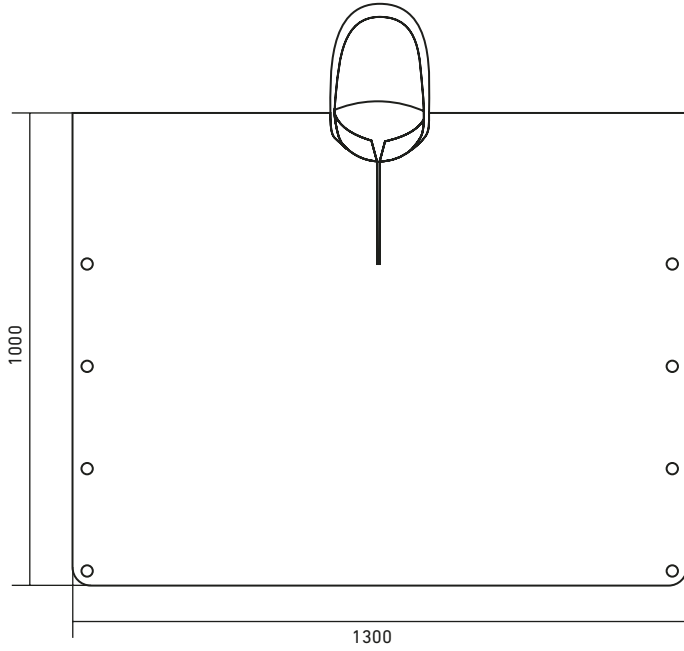
215

224

COLOUR



[mm]



COLOUR



RESULT

LIFEHOUSE EARTHQUAKE SURVIVAL KIT

## **PONCHO MATERIALS**

Shell - Flame retardant ripstop nylon 70D with reflective silver coating, hydrostatic head 6000mm, 56g/m<sup>2</sup>

Insulation- Ultra light thermo down, 800-fill-power

Zippers - YKK Aquaguard Vislon 5VT, waterrepellent zippers

Buttons - Snap buttons plastic, 10mm

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## **FLASHLIGHT MATERIALS**

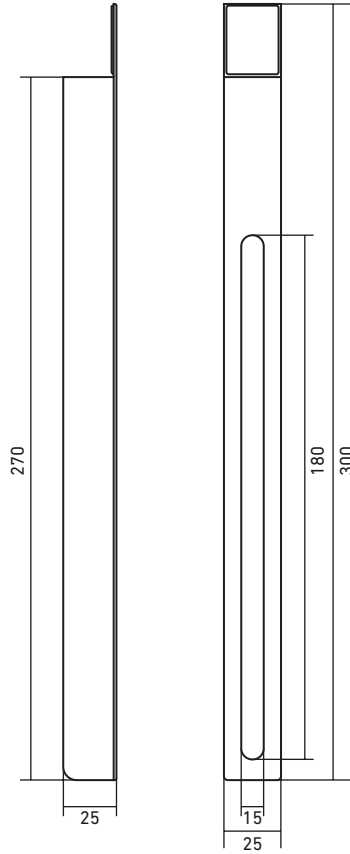
Shell - Cordura 1000D with PU-coating on one side, hydrostatic head minimum 1000mm

Light encapsulation - Translucent silicon rubber

Light - 12 LED strip with 450 mAh battery

Velcro - 20mm wide

[mm]



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224

COLOUR



# *REFLECTIONS*

We are happy to have managed to follow the time plan we set up in the beginning of the project and especially happy with the outcome of the project and the insights we have got along the way.

To always plan for unexpected delays not overestimate your own skills. To work in a team can be hard and we learnt that from several occasions. A valuable insight is that teamwork requires trust, compromising and communication. Communicating ones personal goals early on in the project is a lesson we bring on but all in all we have managed the to fulfil our goals.





# *IMAGE REFERENCES*

All image references are in order of appearance and validated 2016/05/09, mood boards and collages excluded.

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All references are validated 2016/05/09

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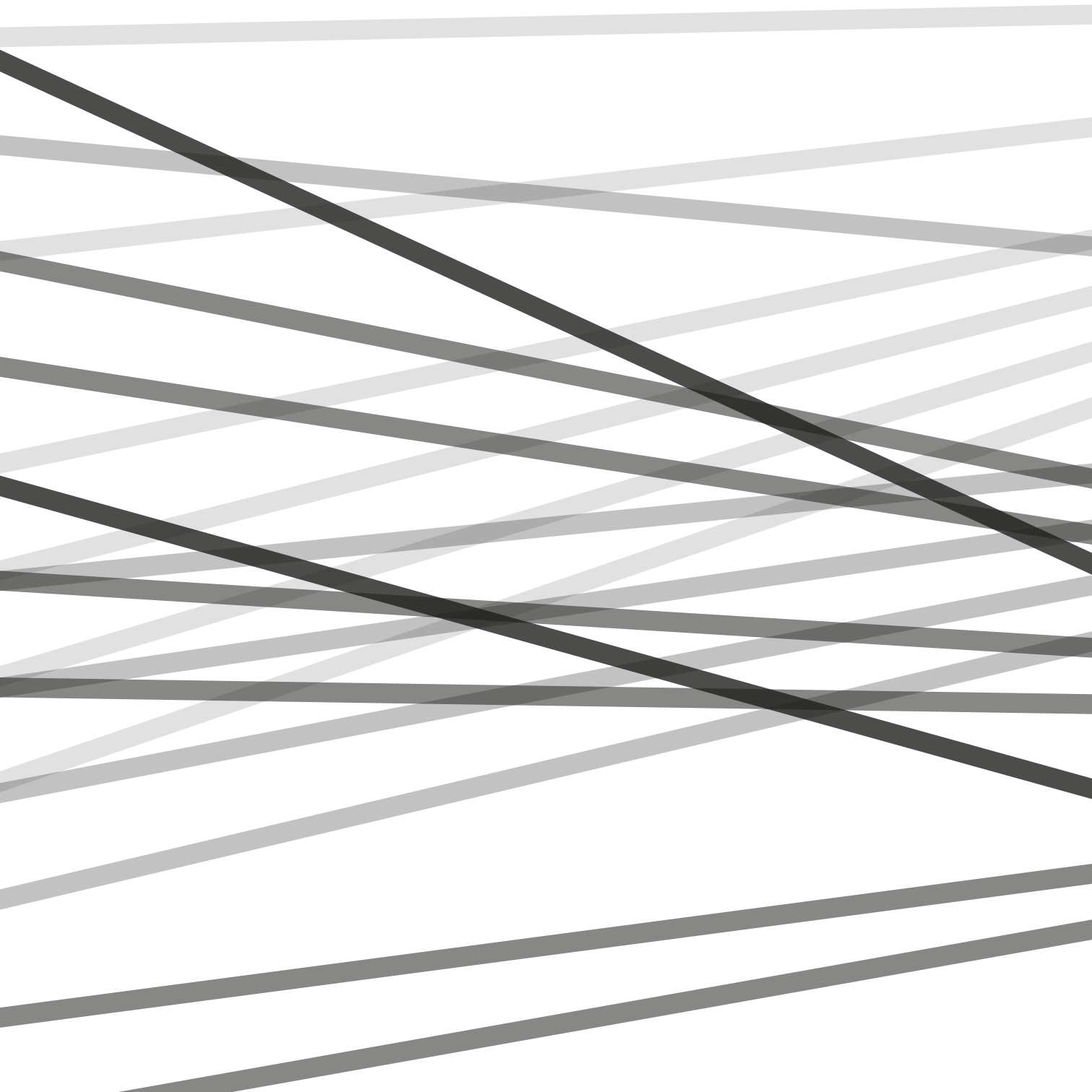
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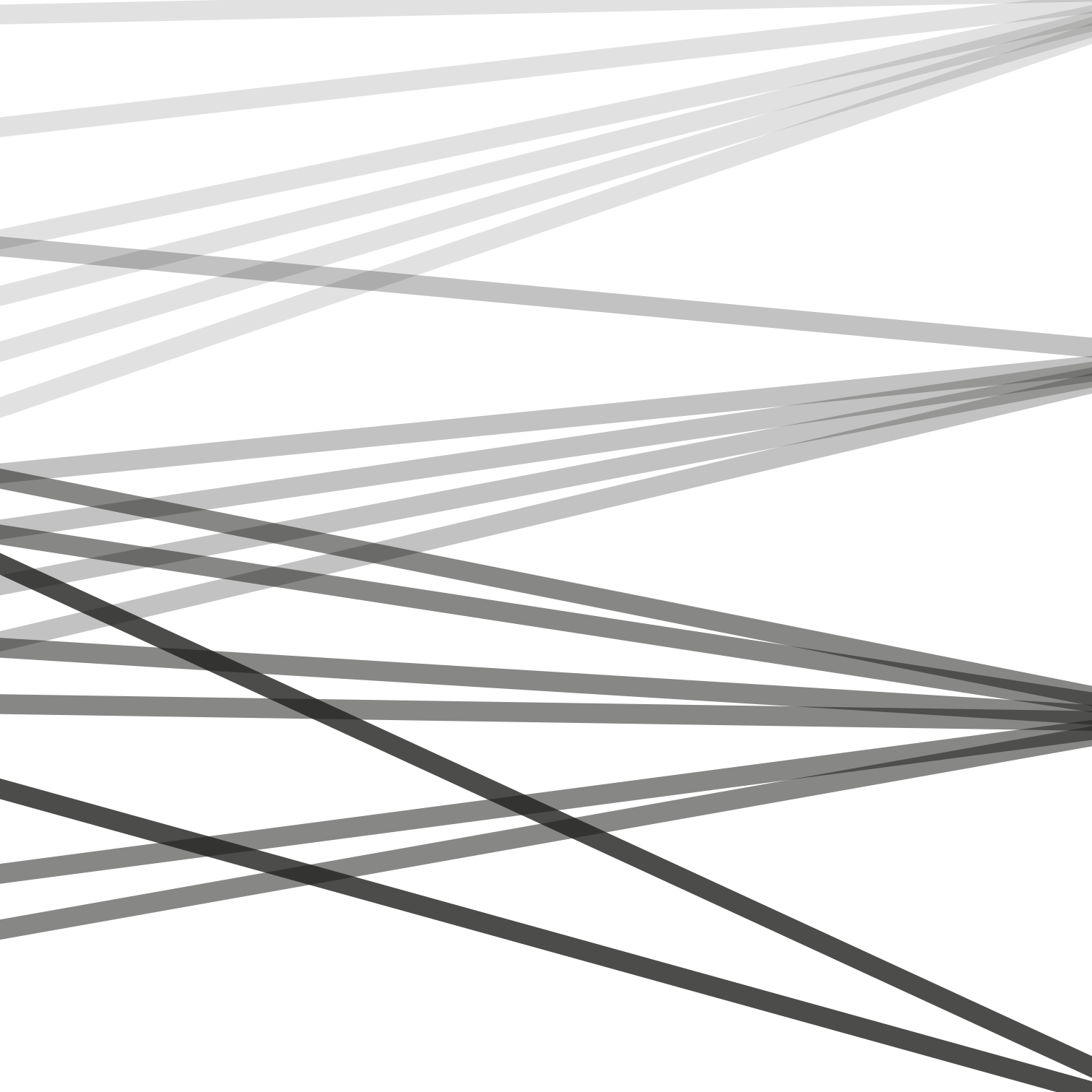
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