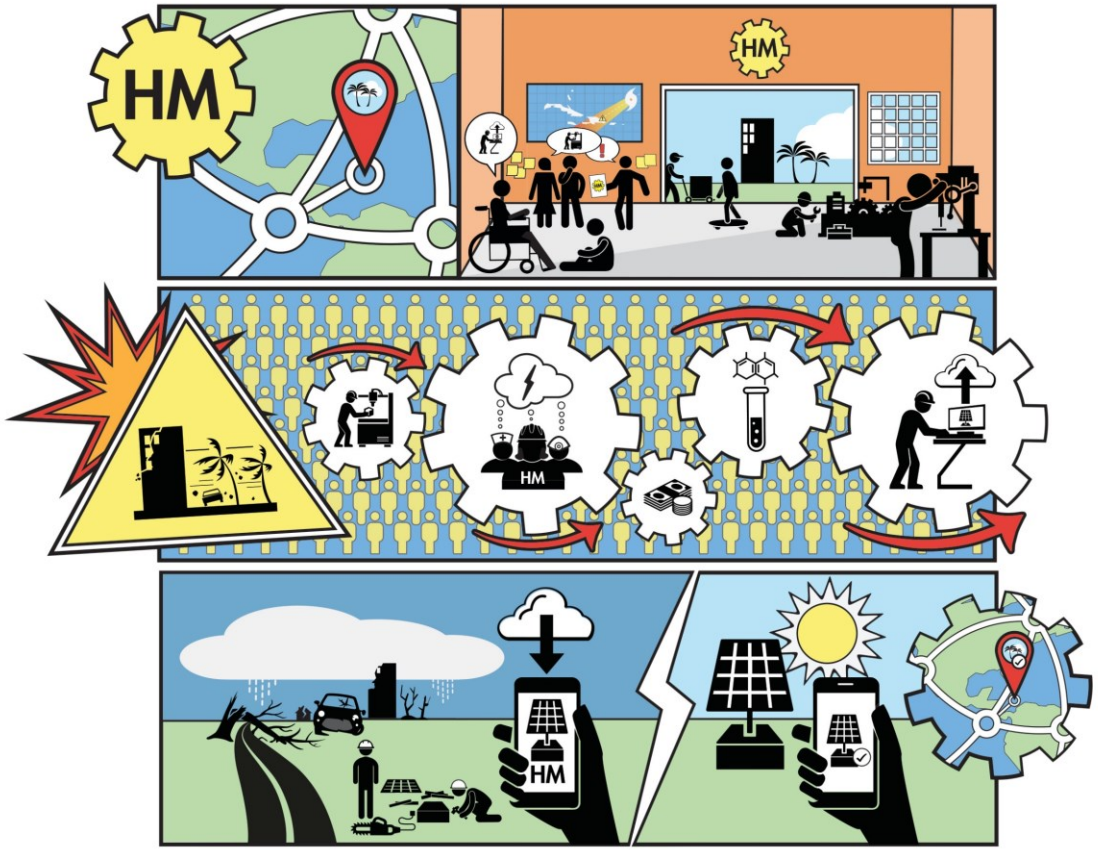
Shelter Winterisation Project Brief

Presented by Andrew Lamb

HUMANITARIAN MAKERS

UNITING TO SUPPORT DISASTER RESPONSE



www.humanitarianmakers.org
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FIELD READY

Field Ready meets humanitarian and reconstruction aid needs by transforming logistics through technology, design and engaging people in new ways. We make useful items where they are needed to solve problems locally. We pass on these skills to others through training and capacity-building. We are pioneering innovative approaches to the toughest challenges regardless of the sector. The impact of this is dramatically improved efficiency making aid faster, cheaper and better.

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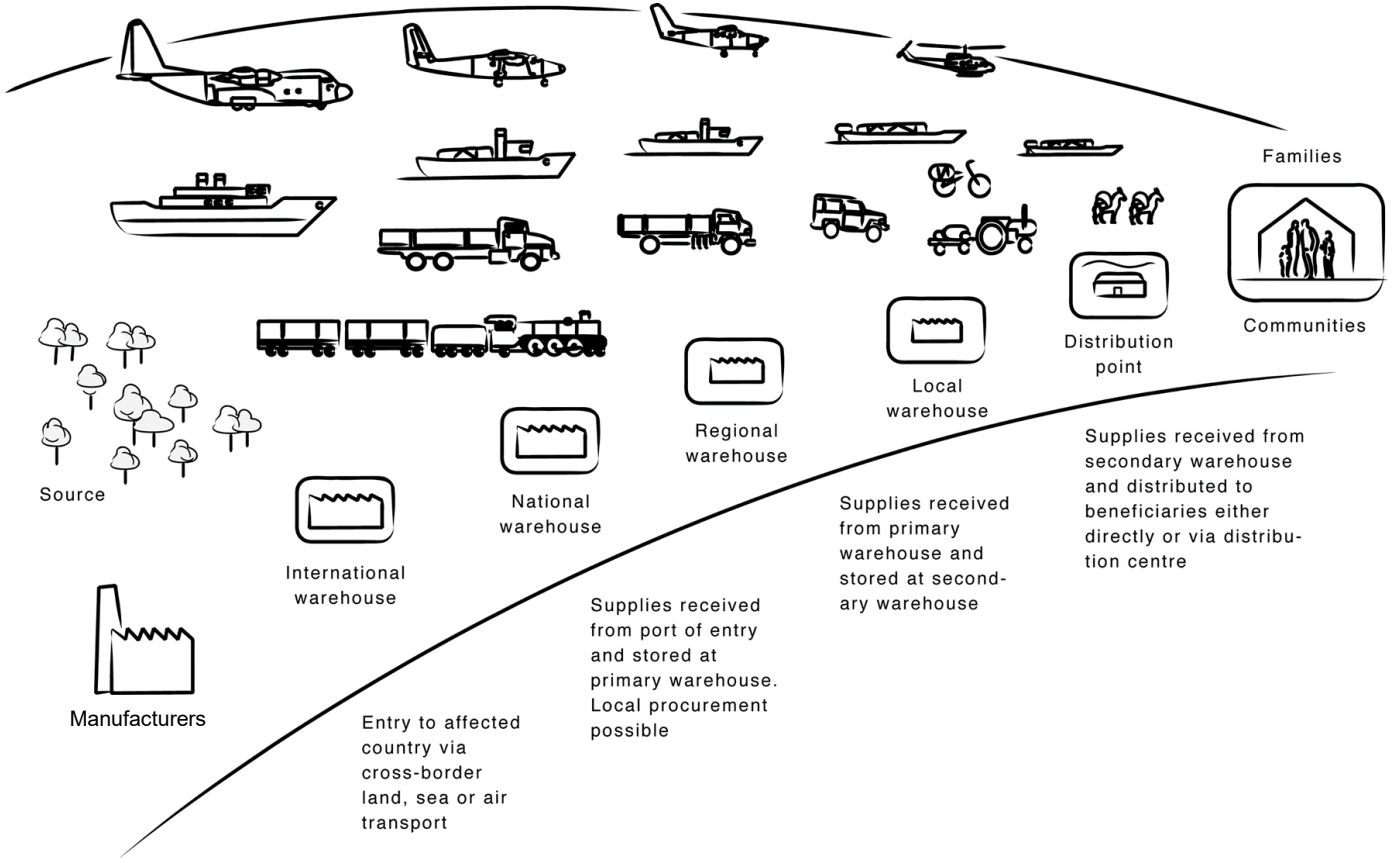
Our Approach

Transforming disaster relief



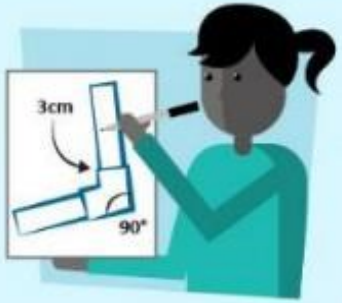
Today's approach:
make aid supplies far away & ship

Tomorrow's approach:
make aid supplies in-the-field

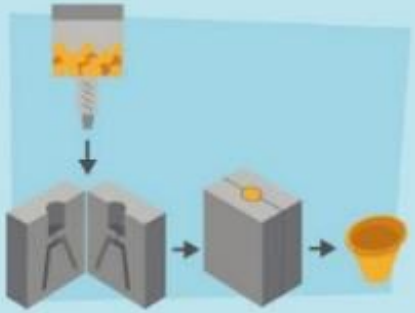
How we work at Field Ready

Assess
Look, listen & understand

Design
Ideate & develop concepts



Make
Manufacture useful things



Share
Test, distribute & train others

Lead
Replicate where there is need

FIELD READ

Nepal earthquake in 2005

- Thousands of earthquake-affected communities in Nepal's mountains are facing up to the grim prospect of a Himalayan winter under a tarpaulin.
- Survivors faced winter without shelter

Survivors face winter without shelter

Basic food, like rice and lentils, provided by the World Food Program, has been hauled up on foot by the villagers themselves.

It is a 12-hour journey down to a depot then back up the steep tracks, shouldering a 30-kilogram load.

The porters are paid around $US10 ($14) for their labour, under the WFP's remote access operation.

That money is typically spent on basic essentials like food and clothing, but with snow already on the surrounding hills, shelter was on the everyone's minds.

"I don't have a house yet, we're still trying to build it," porter Amrita Pandi explained.

"I need to make a house before winter but I don't have the money.

"I'm really worried for my children, I don't know what to do.

"I am living in a cow shelter right now."

> "I am very worried because I don't have warm clothes and it gets really cold here during the winter. It is going to be very difficult to survive this season."
>
> Binita Thami

Another mother, 25-year-old Binita Thami, lost everything, food and clothing included, when the quake ruined her home.

"I am very worried because I don't have warm clothes and it gets really cold here during the winter," she said.

"It is going to be very difficult to survive this season."

https://www.abc.net.au/news/2015-11-08/nepal-earthquake-survivors-face-winter-without-shelter/6920450

Nepal earthquake in 2015

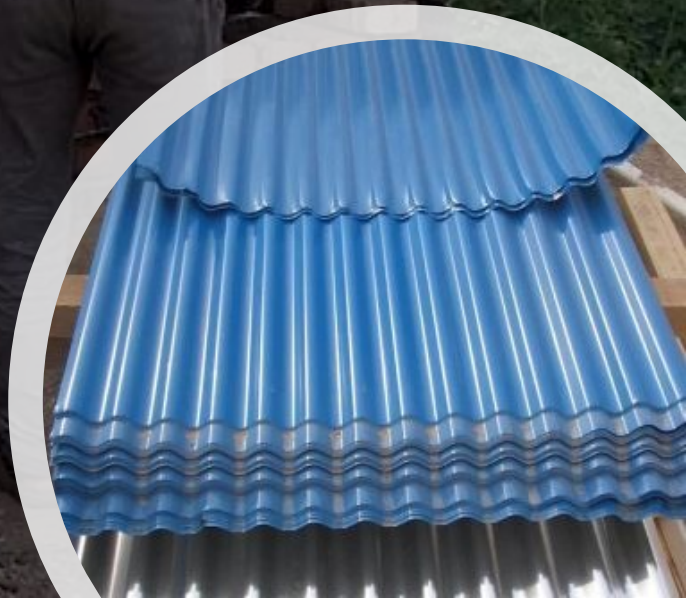
- In the context of Nepal, after 2005 earthquake, more than 200,000 people were displaced form their home. Most of them lost their home completely, or their home were damaged.
- Situation was, a lot of these people, were homeless in the summertime. When winter comes, family with children and elderly to careful. It is very difficult to keep these people warm, health situation was a big problem.

CGI Temporary Shelters and Roof Insulation Research Findings by Field Study:

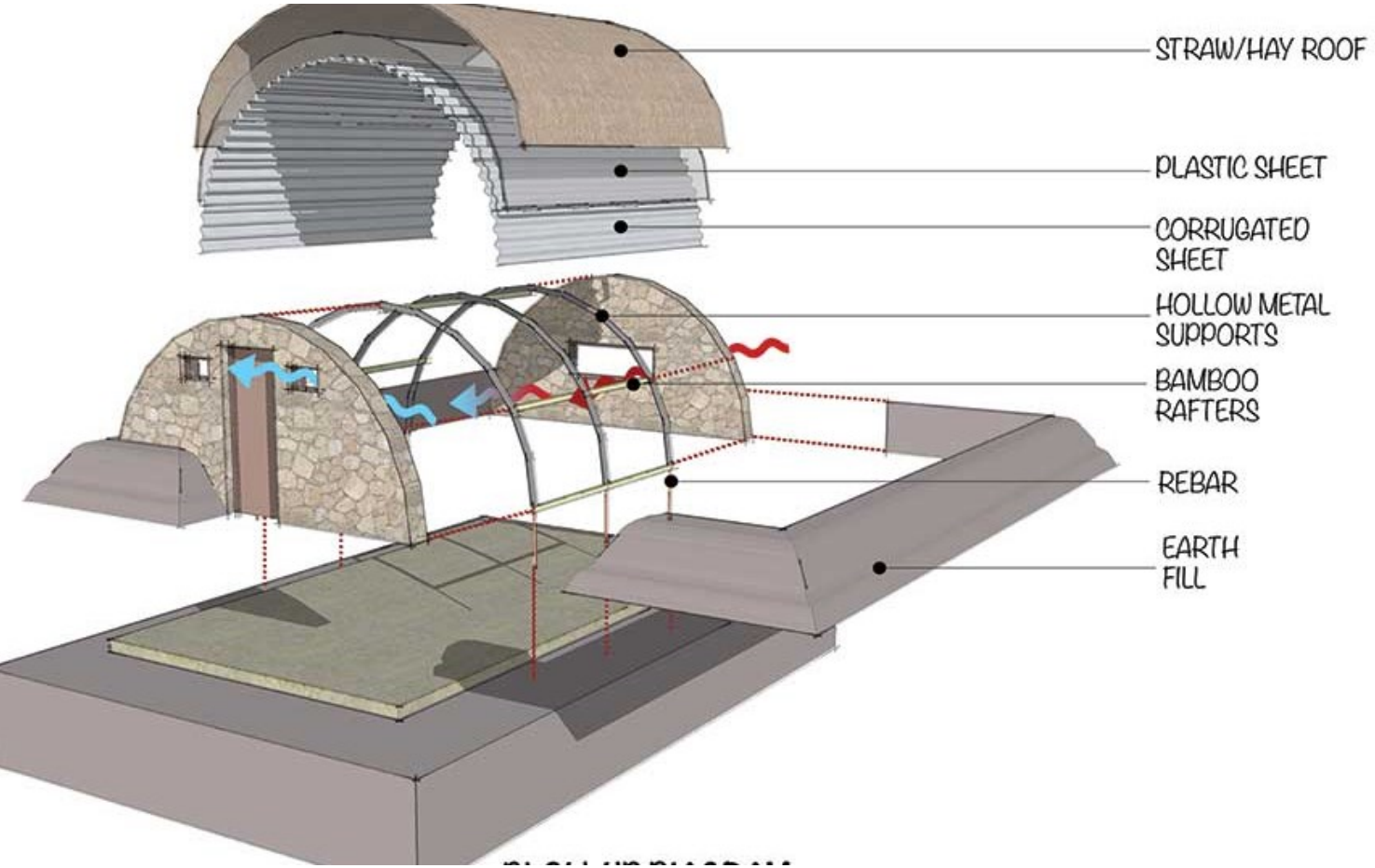
- No agencies, that we worked with, provided insulation for weatherisation and winterisation of these shelters during construction or afterward, despite providing winterisation kits with blankets and jackets annually.
- Residents experienced heat in summer from direct sun, cold in winter, excessive noise from monsoon rains

Shelters for Nepal earthquake

- A lot of shelters, were made of that material, in a very basic construction,
- CGI sheet were very easy to modify to use, you can make it longer or add a door. The advantage was that it was very cheap and easy to make. However it was not warm enough during the winter, and a lot of people used candles to light and warm the shelter.



Field Ready's initial idea



- Focus was how to add a layer of insulation, maybe a recycled plastic sheet in a safe way
  - Environmental-friendly
  - Fire resistant, relatively safe
- Cultural and religious sensitivity towards dirt and dirtiness in Nepal
  - FR had an idea to use trash to cover their shelters, which was not a good idea
- Field Ready wanted to create a product that is replicable, and acceptable to the end users, but also safe from fire. However, due to the lack of funding, they stopped the Polyfloss experiment.

Problem

We need to winterproof, insulating material for semi-permanent refugee housing structures in high elevation areas.

Background:
Winterisation of shelters is very difficult. People freeze to death in the refugee shelters in winter across the world.

The humanitarian response towards this issue contains of volunteer driven grass roots organisations on the ground with hardly any expertise, equipment or funding. Last year two people died because of the cold and countless were sick in the Moria Refugee Camp on Lesbos Island in Greece.

The most common and effective way to handle it, is to insulate the floor, provide good drainage, provide more clothes and blankets and more fuel.

However, the gas is very expensive and dangerous. Let along the logistic challenge, and they are very easy to be stolen.

Constraints in Nepal

- Electronics capabilities and machinery available in Federal province structure of Nepal gives a fairly accurate idea of which cities in Nepal have any kind of industrial capability they include Kathmandu (main centre of industry), Pokhara (the second city), Birgunj on the southern border, Janakpur, Hetauda and Biratnagar.
- All of these apart from Kathmandu would be classed as small cities and have fairly basic industries focused around consumer plastics production (pipes, water tanks, household goods), fabric production, food processing and other agricultural production, jute processing for ropes and sacks, brick making, basic metal casting.
- All of these industries are either small scale industries for local consumption or aimed at larger scale national markets.

Proposed Solution – Polyfloss

To make Polyfloss layers (quilt) for shelters in the winter - a faster machine for 2000 shelters

Polyfloss: the basics

- Based on cotton candy machine
- Uses 12 V power supply and gas to heat the plastics
- Create insulating polymer wool
- Performance of ‘wool’ is similar to glass fibre
- PET and other plastics can be used
- Potential uses include building insulation in construction,
- Inclusion into concrete for strength
- Winterization for temporary shelters

About Polyfloss

- Polyfloss made with Polypropylene currently shows great potential in being used as an effective and efficient insulation material, with initial results showing a thermal resistance comparable to glass fibre.

- Polyfloss is a floss-like (fibre) plastic material made from applying heat to and spinning thermo-plastics in a bespoke machine similar to a candyfloss machine. The properties of the resulting material can be controlled by varying heat and the speed of spinning, resulting in materials with multiple and varying use-cases. Polyfloss made with Polypropylene currently shows great potential in being used as an effective and efficient insulation material, with initial results showing a thermal resistance comparable to glass fibre.

Research questions

The proposed solution will need us to research on these four areas:

1. Increase the throughput of the Polyfloss machine to recycle more plastic more quickly and so scale up production of material.

2. Characterise the thermal properties of the material sufficiently for the Polyfloss insulation to be adopted by commercial markets.

3. Product design and production of the insulation product itself.

4. Economic models for Polyfloss insultation product.

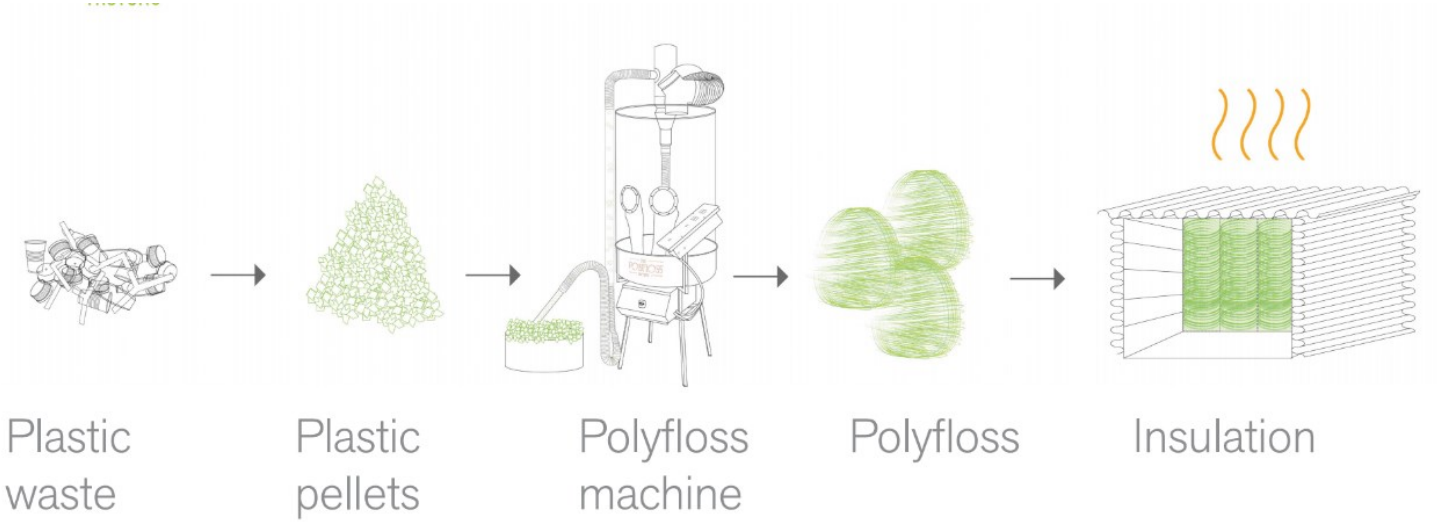
Moria Refugee Camp on Lesbos Island in Greece. Europe's biggest refugee camp.

Technology	Description	Scale	Research Required	Investment	Running costs	Beneficiaries	Positives	Negatives	Requirements to implement	Selling points
Polyfloss	Polymer wool production	Small	Product development, testing, machinery improvements, market, pilot	Medium R&D plus, production machines + pilot	Low	Individuals – focus on IDPs	Low skill, cheap to implement, appropriate for humanitarian context	Unproven tech, fumes, product safety unproven	Heavy Research, Production machines imported	Waste to insulation, IDPs making their own insulation, Portable

Table: Social Plastics Options Analysis on Polyfloss by Field Ready Nepal

Research question 1

Increase the throughput of the Polyfloss machine to recycle more plastic more quickly and so scale up production of material



Research question 2

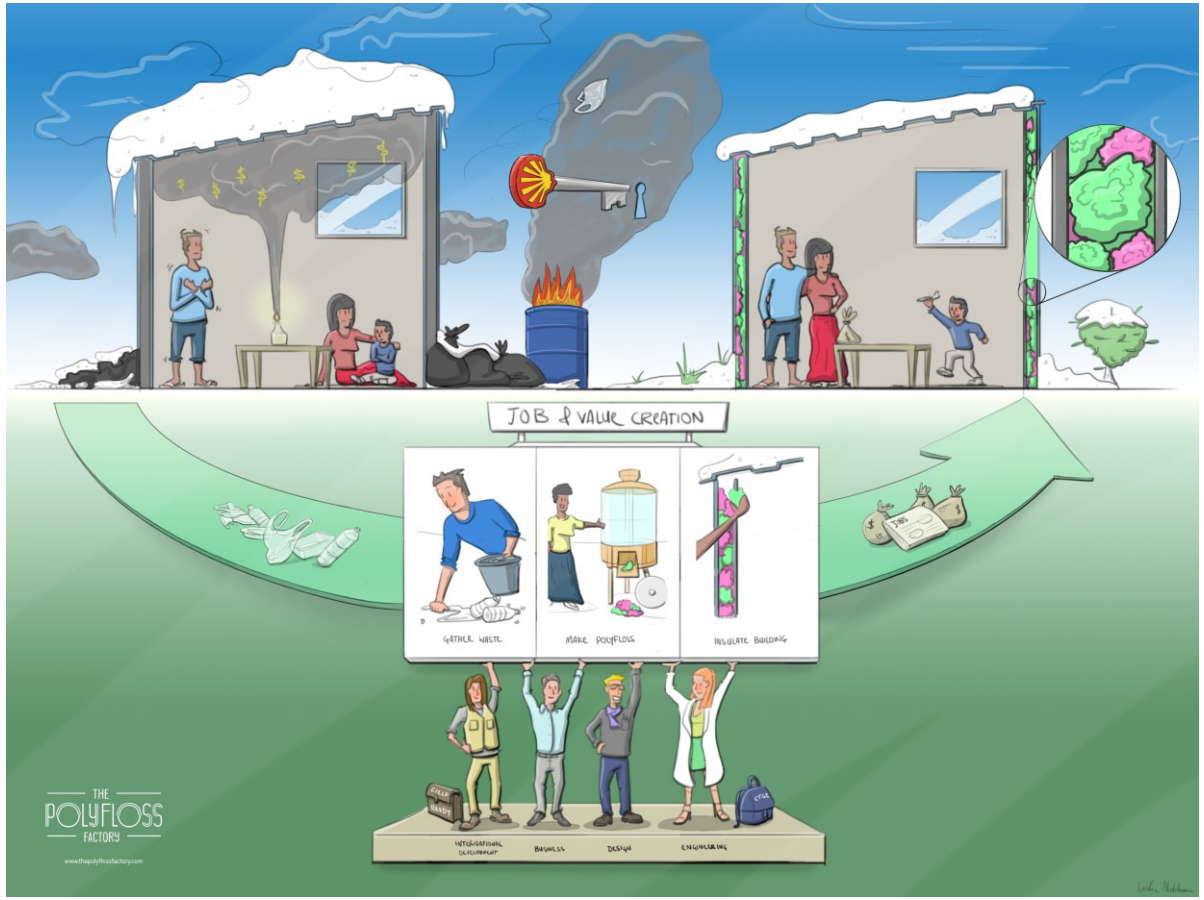
Characterise the thermal properties of the material sufficiently for the Polyfloss insulation to be adopted by commercial markets.

Polyfloss Experiment Finding in Nepal

Research question 3

Product design and production of the insulation product itself

Product design for the blanket, design how to make that product on the field and mass produce that in the refugee camp, concerning that the aid agencies doesn't want to pay for the shipping.



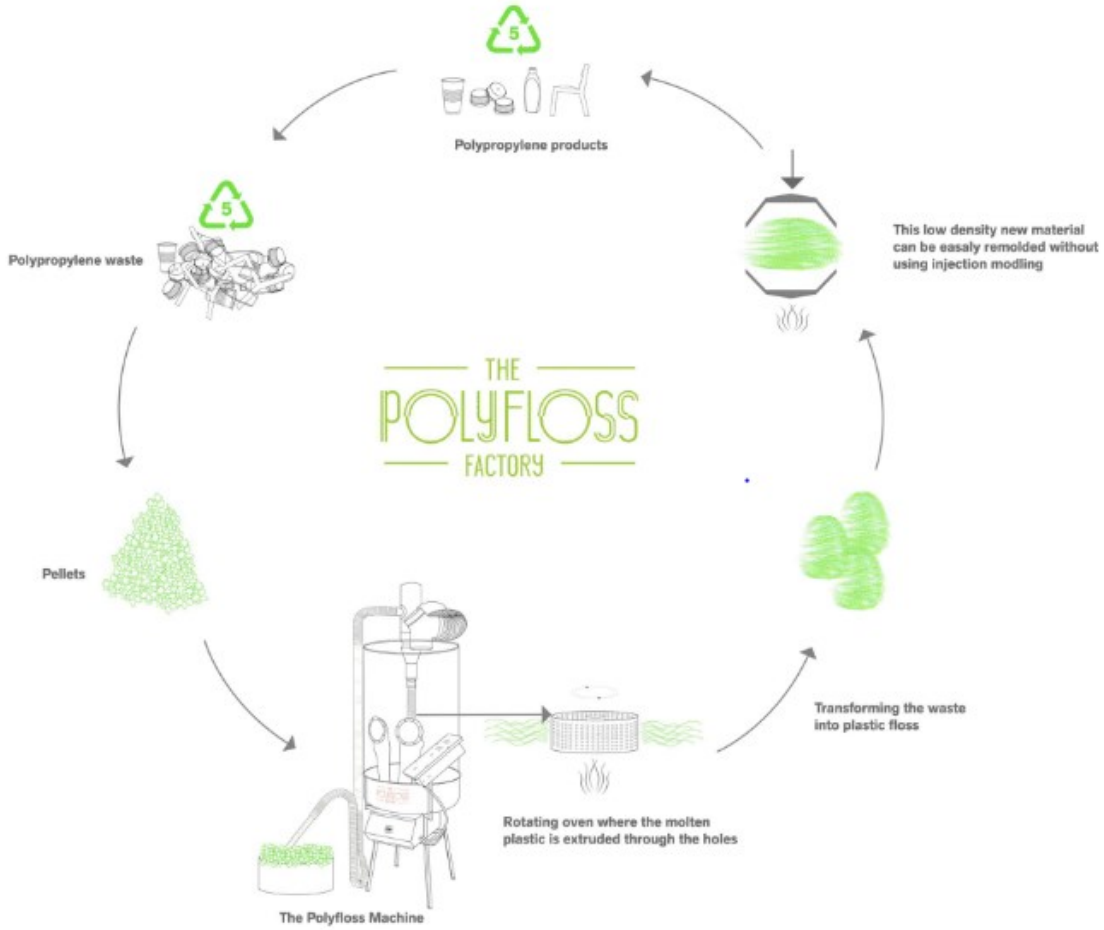
Standard Winter kit

Research question 4

Economic model for Polyfloss insulation product

- Is it cheaper to make it locally or outside?
- Is it creating jobs, are we able to pay people?
- Carbon finance: using Polyfloss technology is reducing plastics wastes and the usage of fuel, is this a case to make a carbon finance?

Note: This will need FieldReady, Polyfloss, and Humanity Lab's social business colleague to introduce the best person to help with this.



Resources

1 Funding

Waiting for result for the 800,000 USD Funding bid

2 Knowledge

- Winterisation standard solutions:
  - https://itemscatalogue.redcross.int/water-and-habitat--6/shelter-and-construction-materials--21/family-tents-tarpaulins-accessories--35/winterisation-kit-family-tent--KRELSHEKTW01.aspx
  - https://www.unhcr.org/53fc7fec9.pdf

- Achievement up to date: CGI Temporary Shelters and Roof Insulation Research
- Polyfloss shelter insulation system analysis.xlsx
- Polyfloss Hyperlocal Plastic Recycling Presentation
- Library: https://www.humanitarianlibrary.org/search-resources?keyword=winterisation

3 Contact

- Field Ready Fiji & Nepal team
- Ben Britton, Innovation Advisor at Field Ready, ben.britton@fieldready.org
- Brynmor John, Technical advisor at Field Ready Nepal, brynmor.john@fieldready.org
- Cecilia Ho, Project Coordinator, Cecilia.ho@fieldready.org
- International Green Development Nepal (Ben Britton can help connect)
- The Polyfloss Factory

4 Partners

- IFRC SRU
- World Vision
- FieldReady
- The Polyfloss Factory
- Airbus
- Centre for Global Equality

Note: about International Green Development Nepal

- **Gorkha Eco Panels** are made in Nepal and provide a pre-fab shelter solution. The company have been pursuing government and construction contracts and so there is a massive opportunity to help them engage with humanitarian need. This is more of the approach Field Ready has been taking in Fiji - working with local manufacturers to improve and refine their products so they meet humanitarian needs. Ben Britton from Field Ready can help with contacting.

Location of the Polyfloss machines

Machines	Note	Location
1 (early version)	Early version slow but can work off-grid using gaz and a 12v battery	World Vision's Nepal innovation lab, Nepal
2	This version has a faster outcome but with a rougher wool quality	Polyfloss Factory, Paris
3	Gaz and battery powered	Madagascar

Thank you

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