Photograph: © Oliver Washington, 2015.
Pipeline IDP Settlement, Nakuru, Kenya

OXFORD BROOKES UNIVERSITY

Refugee shelter: an Engineer's perspective

Abstract

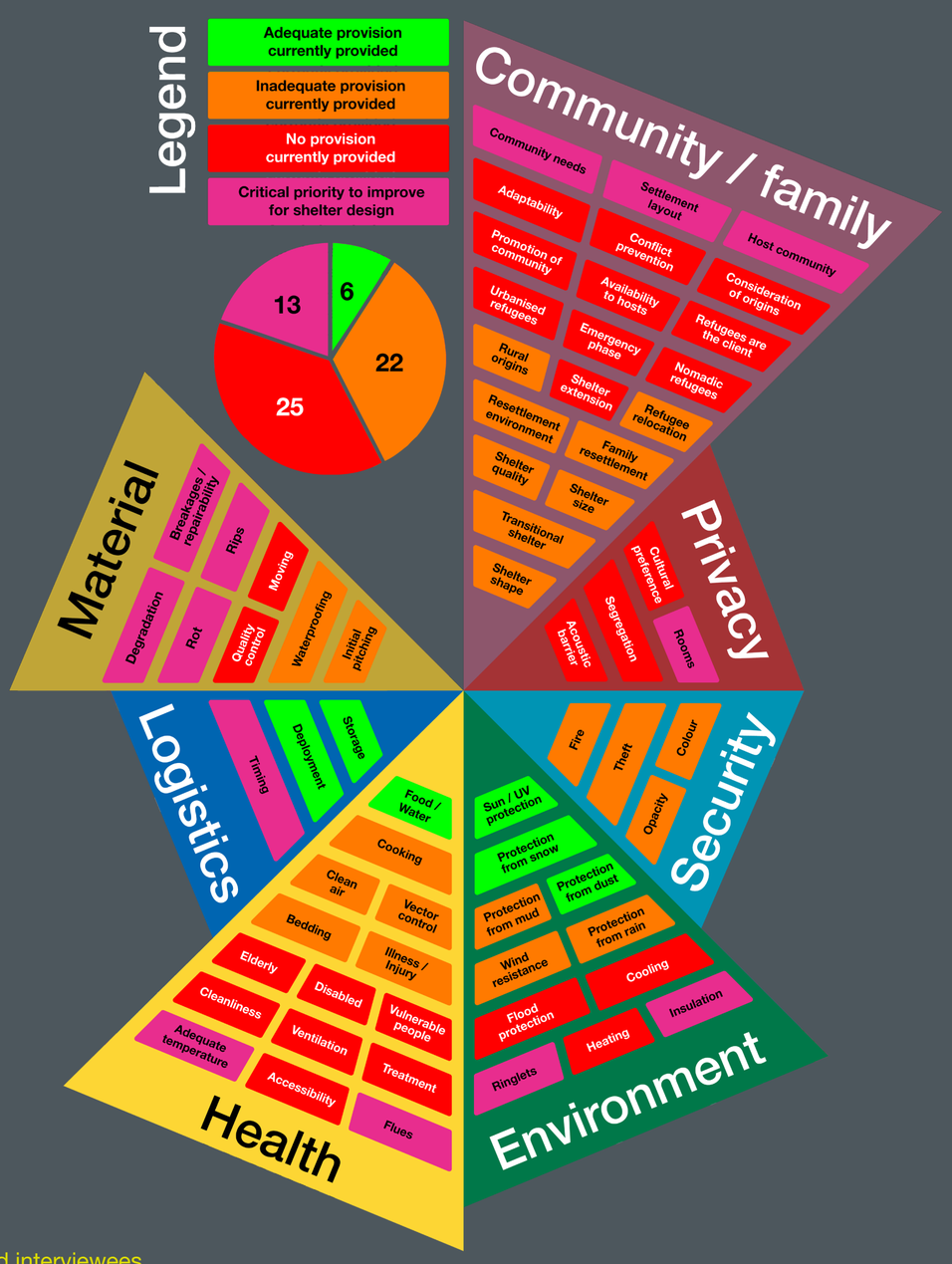
The ongoing migratory crisis eclipsing Europe, America and Africa demonstrates the critical need to develop effective solutions for refugees. Providing suitable shelter for refugees will significantly reduce the number of migrants who feel forced to travel [1]. Currently, the strategy is to deploy tents designed with a life of 18 months, though it is not uncommon to see these shelters being used for decades [2].

Using engineering techniques in a structured, analytical manner will significantly improve shelter performance compared to current designs created by those with humanitarian backgrounds alone. The humanitarian and physical requirements of shelter were analysed ensuring all needs were included, avoiding the current trend which includes only basic needs [3]. The research indicated that although the shelters must be improved, many other processes are also failing refugees.

Through the techniques, many of which have never been used for shelter provision, concepts were illustrated for evaluation. An example is the validation of the insulation properties of canvas, which is critical for the health of refugees and their ability to reach self-sufficiency [4]. The experiment demonstrated how simple and inexpensive design alterations can double the insulation of canvas, or even increase efficiency by factor of 18 using materials locally available to them.

The real needs of refugees

Utilising a thorough literature review and field research carried out in Kenya, a comprehensive understanding of the processes and practices of refugee relief was realised. The chart below is a visual illustration of the considerations required for effective shelter relief. Community / family was the largest area of consideration. Currently, only 6 considerations are adequately catered for, 13 more critical areas require improvement.

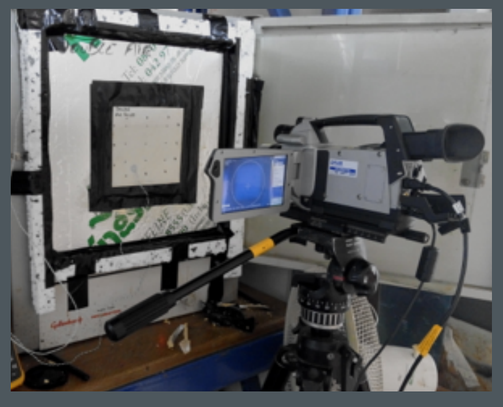


Insulation of canvas

The considerations chart enables the user to experiment on critical priorities. An example is insulation, which has relevance to many of the identified needs of refugees.

An experimental rig involving an oven and an infrared camera was used to test the insulating properties of various forms of canvas.

Simply creating a double walled canvas layer increases the insulation by 50%, filling this cavity with locally available material can increase the insulation by a factor of 18.



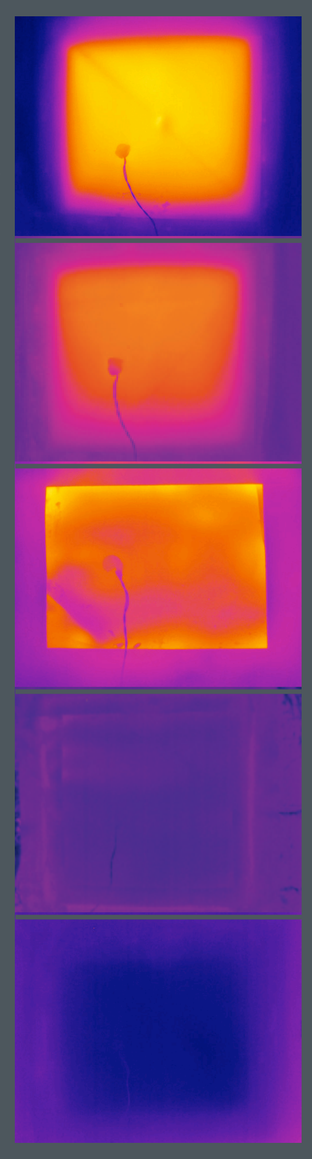
Single sheet
Currently used for shelter relief

Double sheet
1.5 times improvement

Filled with bottles
1.7 times improvement

Filled with cardboard
17 times improvement

Filled with compost
18 times improvement



Summary

By reviewing the whole process and practices of refugee relief using engineering tools, a simple example was suggested that could, with a modified design, improve the insulating properties of canvas shelters by at least 50%.

If it were also possible to create an emergency shelter design that could be developed into a transitional shelter using locally available materials, not only will significant savings be realised along with a reduction in refugee migration, but the health of the occupants will increase significantly.

This ongoing project aims to develop such a concept to ensure that emergency shelters can be easily converted into more permanent residences.

References and interviewees

Research gathered from interviews in Kenya with: [1] Wanguru, S. 'Nakuru County Peace Monitor'; [2] Magenya, K. ' International Displacement Policy and Advocacy Centre' [3] Achacha, P. and Kimani, E. 'Kenya Red Cross'.

[4] Ashmore, J. (2004) Tents, a guide to the use and logistics of family tents in humanitarian relief. Geneva, United Nations; Habitat for Humanity International. (2012) Disaster Response Shelter Catalogue.

Further contributors: Atem, B and Tutu, R. 'South Sudanese Refugees'; Gichari, S. 'Ndonga IDP Resettlement'; Njenge, D. 'Pipeline IDP Settlement'.

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