

Public Summary

A Critical Analysis of Portable Healthcare Facilities in Disaster and Rescue Zones

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DESIGN CHALLENGE

Natural and man-made disasters are pressing matters which require proper management and resourcing. A significant part of disaster response is providing shelter and medical aid to affected communities. Amidst the context of crisis management during natural disasters, deploying fast and effective help is crucial. Most disaster relief missions work based on a complex system, which involves different types of equipment, reliable logistics, highly trained professionals, and a responsible and alert management team.

A significant and indispensable part of disaster response missions are portable healthcare facilities, also known as mobile clinics or field hospitals. These facilities act as temporary structures which provide medical help to underserved communities during mass casualty events (Maghfiroh & Hanaoka, 2022).

Natural disasters are an ongoing phenomenon, which according to UNEP in *Climate Change and Water-related Disasters (2024)* are 90 percent caused by climate change. Therefore, mobile healthcare is in the need of optimisation to ensure fast, reliable and sustainable solutions for communities in need. This project has addressed the challenge of how these healthcare systems could be improved, while considering usability and reliability aspects, to provide the optimal aid during natural disaster emergencies.

RESEARCH METHODOLOGY

The research was initiated by collecting and analysing data from literature and web sources about existing solutions for mobile healthcare, to understand their advantages and limitations.



Figure 1. Research planning.

To validate the collected data, 3 experts who have contributed to natural disaster emergencies in the past were interviewed. The insights were used to develop design solutions in the format of sketches, diagrams and a 3D visualisation prototype. The conceptual solutions were later evaluated in collaboration with design and disaster management experts.

RESULTS

The results of this project provide a user-centred approach in optimising portable healthcare facilities, which include: a revised *facility layout diagram* which promotes intuitive user flow, a basic *3D model* of the facility to help visualise the design decisions, as well as other diagrams and *elaborated design proposals* which aim to improve the existing solutions.

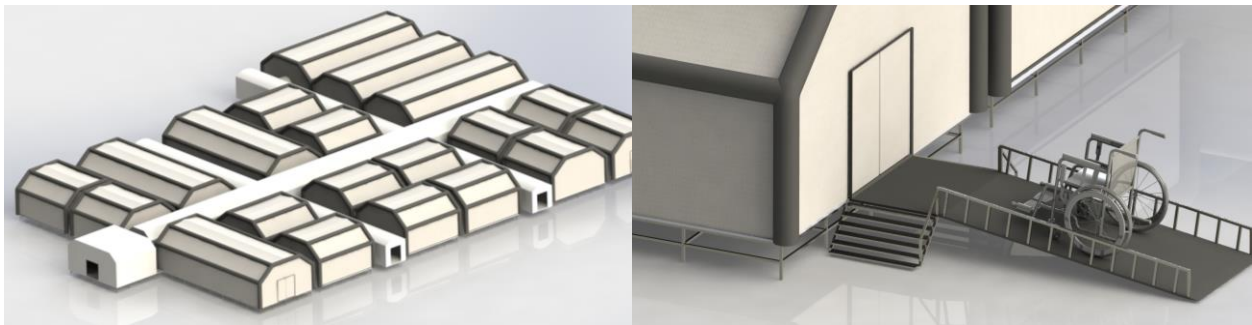


Figure 2, 3. 3D visualisations of the *Hospital Module*.

The suggested outcomes focus on creating facilities which are modular, easy to handle and deploy, and which can serve communities for a long period of time in a sustainable and self-sufficient manner. Additionally, it is important to mention that a key finding is the significance of designing while considering users, and how it can improve the experience of stakeholders and validate the efficacy of the system. Although limitations such as prototyping constraints and small sample sizes are acknowledged, the study emphasises the necessity for continued research and holistic design approaches to address evolving disaster management needs. Stakeholder involvement and technological innovations are recommended strategies for future research ventures aiming to create more effective and sustainable portable healthcare solutions.

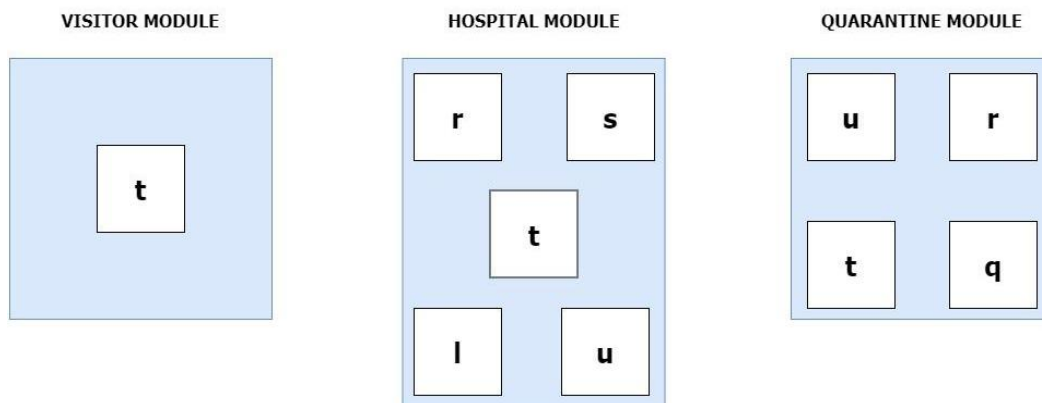


Figure 4. Medium level design of the facility layout.

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