POLITECNICO DI TORINO

# Honors thesis

Architecture Construction City

*Abstract*

**The Ebola case.**
**A possible approach to the problem and a treatment unit design.**


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December 2015

Nowadays the world is increasingly globalized. The connections between countries have been developed so fast that everybody has the opportunity to travel and reach anyplace in anytime. Besides positive aspects, this new feature of our society has increased dramatically the large scale spreading of infectious diseases, which, only few years ago, were destined to die out in limited a period and confined areas.

The most sensational example of these new dynamics, was the Ebola outbreak in 2014, since it was a potential risk to the overseas nations. From 1976 until 2014, Ebola's outbreaks have been several. Nevertheless they occurred always in confined areas of the African rainforest (which typically host reservoir of the virus) and extinguished by itself. In fact, the contagion takes place only through direct contact with body fluids of infected people.

The outbreak in 2014 was huge because once the virus reached the suburbs of capital cities of Guinea, Sierra Leone and Liberia its spreading went rapidly out of control. For the first time the world had to deal with a medical emergency, in which specific field hospitals were required to treat infectious diseases in countries characterized by a tropical climate and whose infrastructures were damaged or absent.

In this case, the response to the emergency was rather generic: the treatment centers were formed by units used for housing emergencies due to natural disasters or wars which were not adequate to face Ebola outbreak. In fact medical staff could not take care of patients in a correct way and eventually some infections occurred within the fields themselves.

The project developed derive from the publication of a call for candidature by the International Union of Architects - Public Health Group. The goal is to face the health emergency, in case of new waves of Ebola epidemic, throughout a peculiar system that will ensure both adequate psycho-physical condition to patients and physicians and will aim to stop the epidemic promptly, before it reaches the outskirts of urban centers.

The research has concerned several areas: climate and transportation's analysis of the affected countries, the study of the disease's development in history and an epidemiological analysis of the current response to the emergency.
All the information collected during this preliminary phase has been translated in the project using a needs-requirements system. Thanks to the research, several needs, concerning different areas of interest, have been highlighted. More in detail the attention has been focused on medical, climate, size, comfort, transportation, installation, accessibility, security, functionality, reusability needs. Afterwards they have been related to specific project requirements, in order to ensure the achievement of the objective in charge. The result is a synthesis of the solutions found out for solving the requirements and the suggestions belonged to an irrational component, which is typical of a designer process.

The project outcome is a new configuration of a minimum treatment center, expandable, and composed by modular tents. Each tent is easily transportable in pick-up, the more effective means of transport to reach villages. The tent is pneumatic in order to make easier and to speed up the assembly and it is supported centrally by a metal cylinder that houses all the facilities required for the each medical operation. The floor is also pneumatic, covered with aluminum plates, adapted from a technology used in the marine field. Each tent can accommodate 10 patients in beds which are divided by separators, to

prevent infection among patients. The skin of the tent is reflective, to minimize the incoming solar radiation. It also hosts a photovoltaic film to generate part of the energy necessary for the functioning of the field. An extractor allows the exchange of air and ensures not too high temperatures inside the tent.

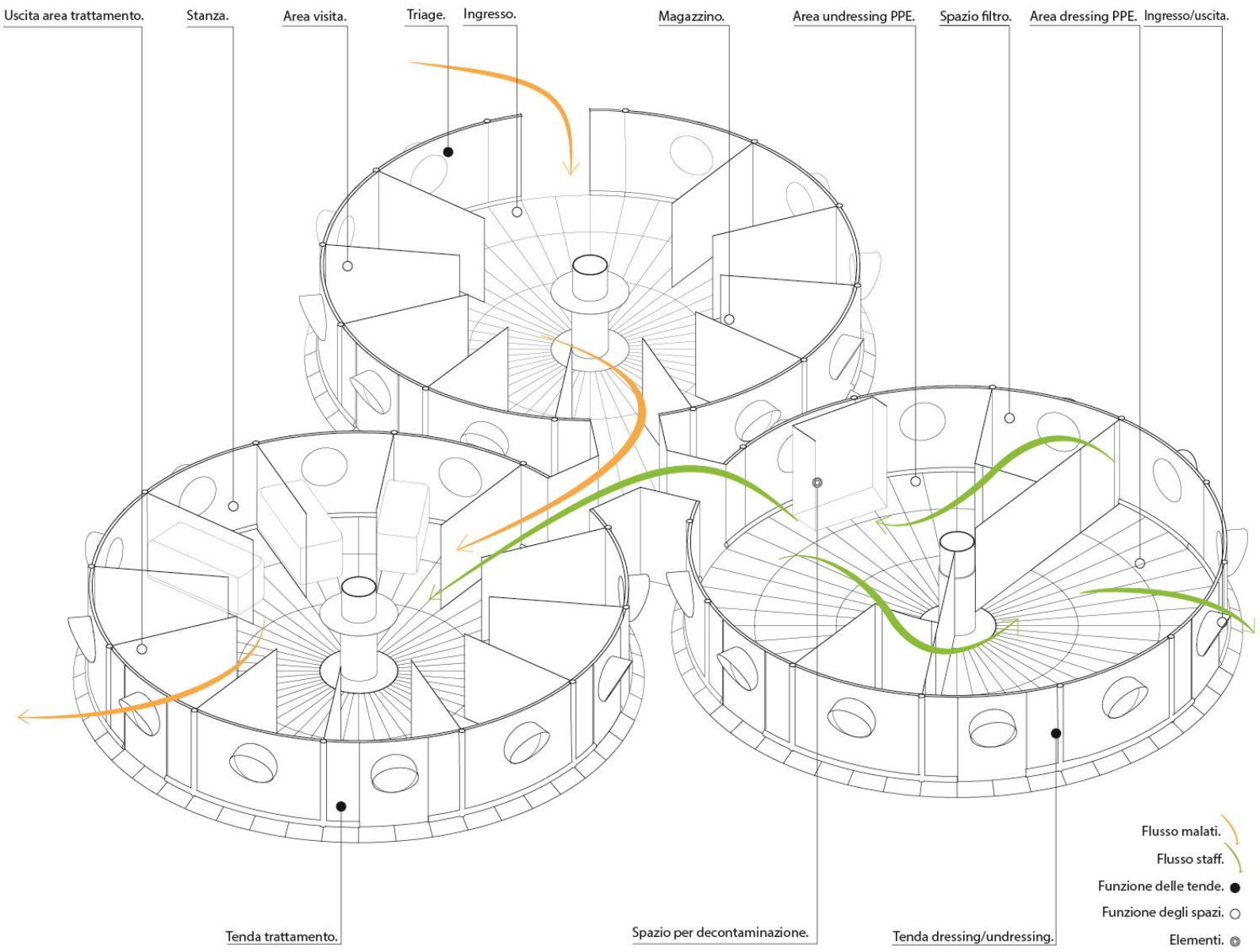


Image1: Operating principle strategy of the treatment center minimum configuration.

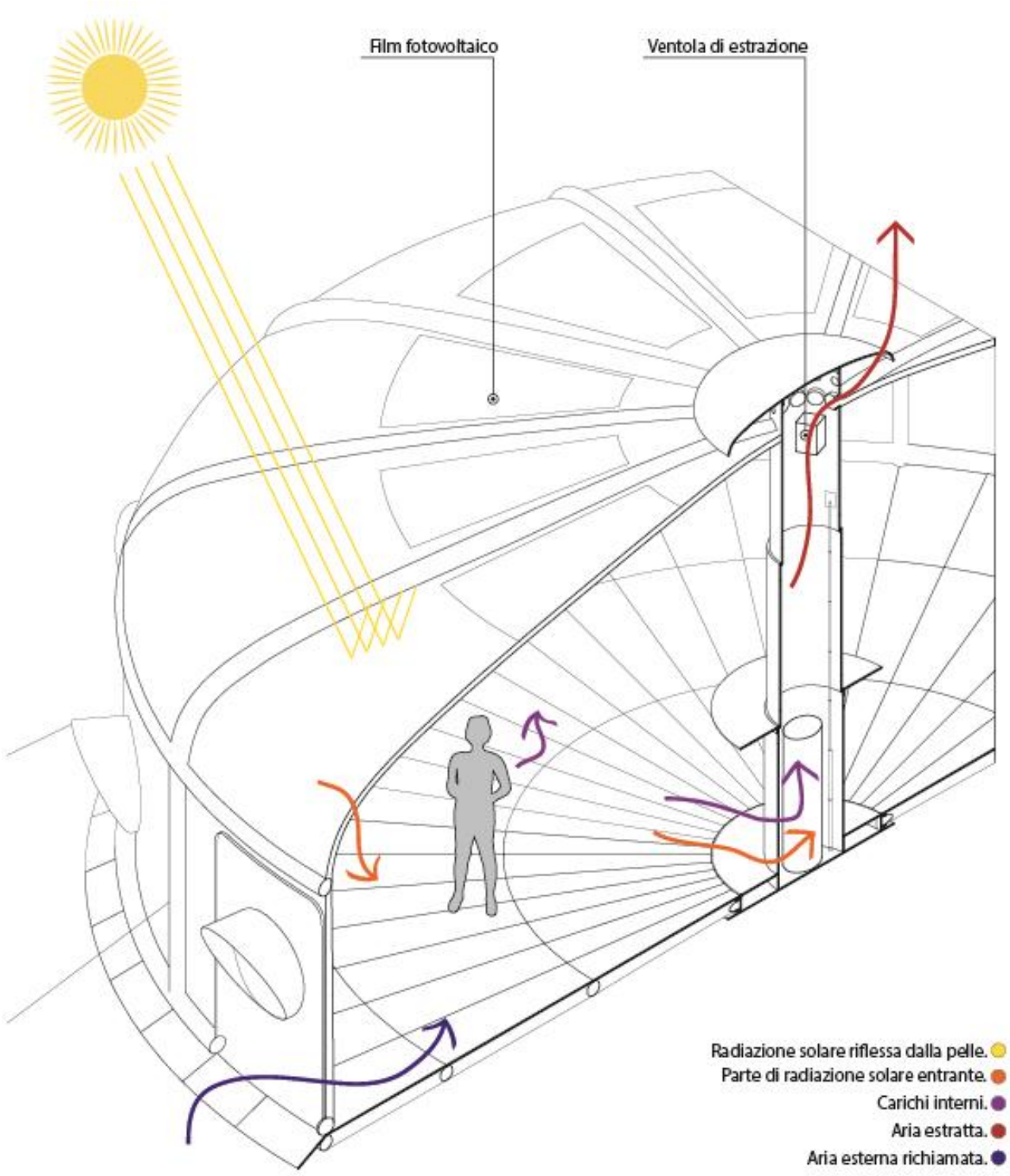


Image 2: Temperature controlling strategy of a unit-tent.

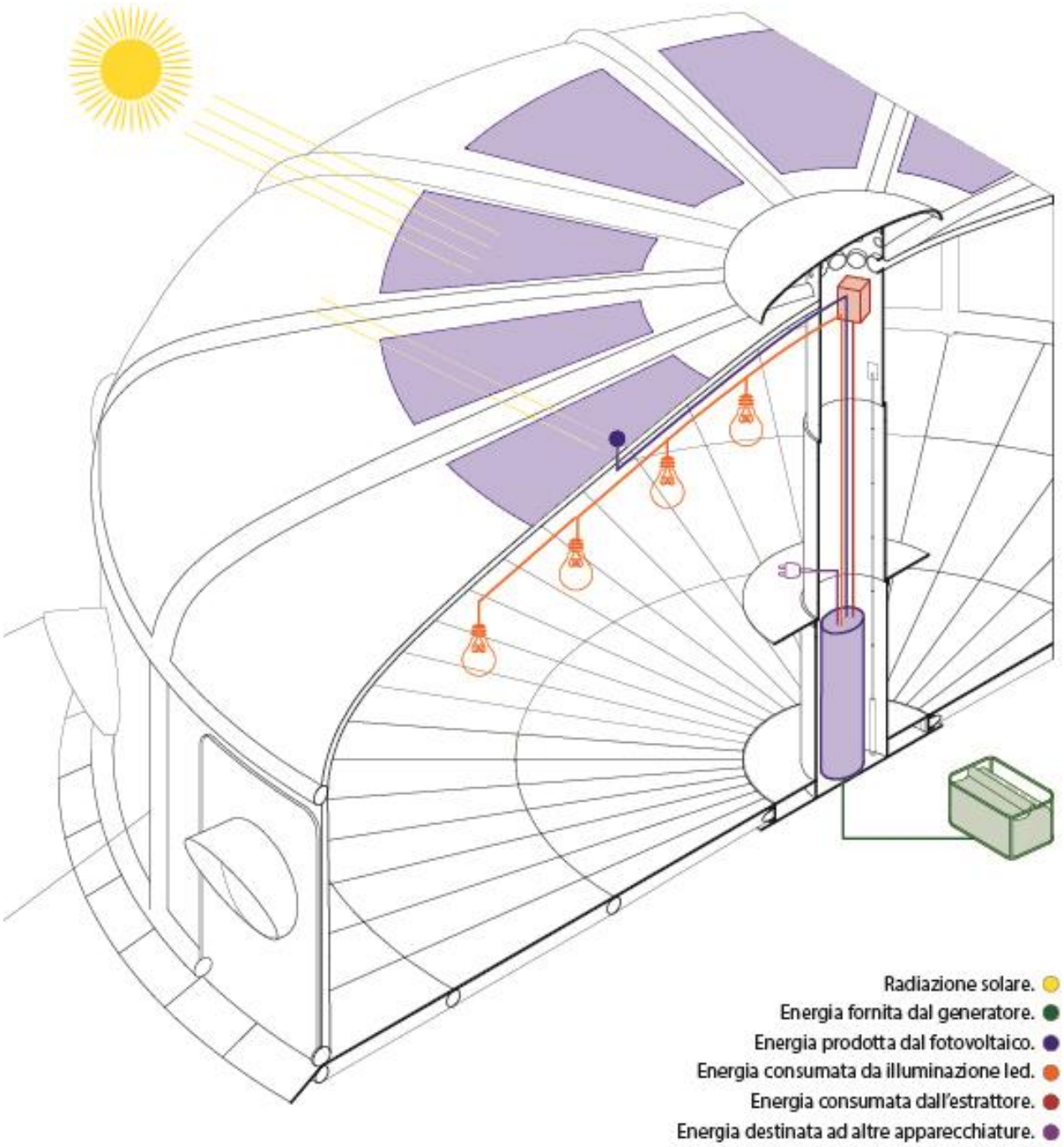


Image 3: Operating principle strategy of the unit-tent system

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