The genius loci in the globalization millennium: temporary dwelling

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Abstract

The concept of living stability is inherent in the sedentary lifestyle of living for a human being. In the past, difficulties of movement and geographical barriers have produced the interaction between the identity of people and the place inhabited: the genius loci. In the globalization millennium, the possibility of unlimited travel has led to the reinvention of nomadism and the consequent change in the design and requirements of the house. Natural disasters always require, as a result, building temporary shelters that allow people to shelter, waiting for the restoration to the situation prior the tragedy. Being an individual as a citizen of the world, nowadays, the genius loci is expressed in temporary housing, which is connected to the usual way of life and not to an unusual situation, limited to a period of time waiting for a change. When drastically reducing the amount of time that housing stands inside a certain area, it is necessary that it does not cause environmental damage. In light of these thoughts, it is possible to define the problems associated with temporariness and the requirements that allow one to solve them. A feasibility study is herewith proposed, for a temporary structure of housing, consisting of a steel structure with articulated dry joints, inside which are inserted, by the aid of a sliding system, three-dimensional prefabricated modules in steel and wood, like a system of chest of drawers. Our preliminary study of materials, building techniques, transportation and assembly systems, has allowed us to design an opened and infinitely expandable building unit.

Keywords: temporary housing, flexibility, new-nomadism, emergency, modularity, opened building.
1 Nomadism, permanence and new-nomadism

At the origins, the man was nomadic, the displacement was necessary to get food for survival, by hunting, fishing and gathering what nature offered. The man needed only a shelter to defend himself in the night by wild animals or to protect himself by adverse weather conditions. The house is the archetypal place of shelter, to protect from what is outside, a safe place for the family nest and it has huge sentimental and emotional value.

With the practice of agriculture and of breeding, it was necessary to stay in one place. The permanence of man introduced a new way of living and the habits and the customs of people changed with it. The permanent home also has made it necessary to protect even the productive activities that guaranteed the sustenance of community.

But even in a sedentary society the need of temporary buildings may arise, designed to be used in a certain range of time and in a particular place (typical characteristic of the nomadic lifestyle), for many uses often other than housing as deposits, services, exhibition spaces, construction sites, markets etc.

However, in nomadic society, particular places become recurring in specific periods of the year, thanks to their characteristics, such as the presence of a source of water, favorable climate for the settlement, presence of natural shelters etc. The cyclic stay in certain places can be considered a form of “permanence”, understood as a situation that is repeated within a set period of time in a specific and characterized place. It becomes a reference for the nomadic as much as the home is the reference for the settled man.

Therefore, the permanent or temporary house is a space associated with a specific people and with the places in which the community live. However, the house has design features, which may be changing, related to a specific soil, climate, natural resources and materials available. For this reason, the yurt, the teepee and the black tent becomes recognizable, as well as the European architecture is distinguished from eastern architecture etc.

The history of nomadic architecture wasn’t antithetical to traditional architecture, with prevalence of one or other, depending on the age and place. Surely, in civilization, the way of permanent life has led to a greater organization and made the society more complex, but also more rigid compared to the change. Also the stability has allowed a more deeply rooted identification between people and place where they live, generating the genius loci.

In the XX century, the possibility of quick travels in the world, the change of society resulting from globalization, which breaks down borders and leads man to be a citizen of the world, have given rise to a phenomenon of new-nomadism. More and more people are constantly moving in our planet and the benefits of the ability to quickly share information and knowledge mingle with the risk of producing a society without origins and identity, which can’t be identified in a specific place.

Even the great works often do not testify the essence of the place, the history and the spirit of a people, but express the conception of the architecture of Archistars, who compete in the achievement of new technological frontiers.
Then, what is the connection between the citizen of the world and the world? The genius loci of the XX century can manifest itself only in temporary architecture, which is associated with the usual way of life and not with an unusual situation limited to a period of time waiting for a change. The people do not live in temporariness pending the stability, but the temporariness is the law that endures. The need to make journeys frees architecture from a conception of rootedness to the ground, of immutability, to restore the balance between architecture and nature that was lost when stability came. In fact, although the first permanent home can be considered the cave, namely a natural cavity in the rock in which man is camouflaged in nature, in the evolution of permanent architecture the man has attempted to dominate nature, he has changed the territory to his liking, producing irreversible damages, exploiting the otherwise inaccessible areas, excavating in the hills, removing vegetation, drilling, building with concrete.

Unlike the nomadic man is always in synergy with nature, lives with it and lives respecting it.

The new-nomadism requires, however, a house that meets the requirements of environmental comfort, similar to those of the permanent architecture, and that seeks sustainability, through the features of temporary architecture, namely the ability to deconstruct and change the space, without harming the environment. On one side, therefore, the architects seek solutions to meet those needs from scratch, on the other the architecture, described as stable, is appropriating of the connotations of the temporariness to control the entire life cycle of the organism construction and to plan its transformation. Therefore, even in the Countries historically related to the stable architecture, a change in design approach is undergoing, to encourage reversible enforcement techniques and spatial conformations, flexible and customizable.

Moreover, the temporariness implies the compliance of the building organism to a contingent necessity with specific characteristics, but there isn’t a maximum usage time, beyond which a building cannot be described as temporary. For example, if, as often happens, in the slums of a big cities, a caravan, is left in the same place during its whole life, it doesn’t cease to be regarded as a temporary accommodation. The tent is potentially mobile, flexible and reversible, that’s why it is a temporary shelter. If it is not really moved, removed or modified it doesn’t change its temporary nature.

The temporariness of a building structure, therefore, is derived exclusively from the constructive characteristics that allow it to be reversible, flexible and moving easily, quickly and without causing damage to the environment. Therefore, a tent or a high-density building, if they meet these requirements (albeit each according to specific logic) can be considered temporary.

The design and construction choices (materials, technologies and techniques) affect the speed and ease of assembly-disassembly, the portability, the relationship with the environment, the management (installations and maintenance). In function of this, the temporary systems may be more suitable to a temporary short-term or to a temporary medium term.
2 Temporariness aspects nowadays

The concept of impermanence in building is the result of the need of making use of a space for a function related to a contingent need, limited in time. When that need ends the space has no reason to exist more or has to be converted to other uses. In the XX century, the society responds with temporariness to its rapid changes and to the changing needs. The temporariness continues to exist even in areas traditionally linked to it. In this way, it permeates many areas of life. It is the case of exhibition building structures, installations of temporary buildings intended to temporarily replace the permanent location of offices or homes, while waiting for the restructuration of whole building sectors, houses aimed to social or working groups “unstable” or “nomadic” as immigrants, commuters and students, houses for holidays, homes for sustainable tourism. It is, finally, the case of the emergency housing due to natural or man-made disasters. In all these areas, the temporariness has both, characteristics that remain unchanged, and features that otherwise change according to the usage time of the building organism.

The globalized society in its transformation defines new requirements for living. It’s a change of perspective unique in the history, because it combines the search for belonging and comforts of a stable home with the need of structural characteristics of temporary accommodation. To define these requirements, we can’t learn from similar situations in the past, it’s necessary to refer to the areas traditionally linked to temporary housing. Temporary accommodation for holidays, military encampments, as well as temporary housing used in the first emergency (tents, caravans, containers), designed and built for being used for a few days or a few weeks, have characteristics that make them not responding to requirements of comfort that the living of the XX century requires.

Unlike temporary accommodation for emergency related to an intermediate phase, namely that exist from the first emergency to the restoration of the situation prior the tragedy, having a usage time of some years, must meet the requirements of comfort similar to those of permanent housing, while remaining reversible and transportable.

Therefore, the housing needs dictated by the change implemented by globalization, which require a comfortable home and, at the same time, flexible and reversible home, coincide with the needs of a temporary accommodation for emergency for an intermediate phase, as they have a similar usage time.

3 Temporary housing in emergency

There are countless damages, caused by the rebellion of nature to man’s dominion, just think to earthquakes, tsunamis, volcanic eruptions, which reduce the man’s megalomania and remind him to the respect of the laws of the Nature.

The temporary dwellings that are used in emergency situations have several limitations. “It is used for a short time” becomes often a justification for the lack of comfort, flexibility and reversibility. Referring to the temporary structures set up for emergency, linked to the intermediate phase between the immediate
emergency and the restoration of the situation prior the tragedy, such as wood prefabricated structures, they have a good comfort and an average flexibility, because they are not conditioned by the dimensional limits imposed by the transport, but they have long assembly times and cause irreversible damage to the soil, requiring a support surface in reinforced concrete, which makes them permanent to all effects. It is not a coincidence that, often, the aggregations of precasts, though born as temporary structures, are not removed until the end of their life. Moreover, all systems, currently used, have the characteristic of producing low-density aggregations with a considerable expenditure of ground. Emblematic are the achievements of the building plane named M.A.P. (Temporary Housing Units) and C.A.S.E. project (Antiseismic Sustainable Eco-friendly Complex) built in L’Aquila in emergency response following the earthquake. They are building organisms certainly not reversible and convertible, for which it is already hard to solve the complex problem of management and maintenance of the built houses.

Unfortunately, there aren’t the only negative example in this regard. In fact, analyzing the temporary shelters set up in Italy after several catastrophic events from the XX century to today, you can see that there is an, often insufficient, living standard, and problems related both to the coexistence and to the building technology of the living module. The lack of vary the allocation of storage space and the distribution structure according to the needs and the absence of privacy spaces, generate problems of overcrowding, resulting in a lack of intimacy and, in the most critical cases, in unhygienic conditions. Housing is rigid in its conformation, cannot expand, there are not equipped spaces for semi-private outdoor living, allowing users to customize the housing unit. Passing the time the result is slums with poor sanitation, without a formal and functional coherence, where the inhabitants take without permission public spaces with sheets or extemporary gazebos juxtaposed to the houses. Failure to maintain enough comfortable environment regardless of location and seasonal variations and the lack of suitable establishment for shading, creates problems of thermal comfort, humidity, nasty scents, with consequent impact on the users health [1].

Therefore, in light of the encountered issues and of the carried analysis, it is possible to establish the requirement that a temporary medium-term housing must satisfy. They are: easy assembly-disassembly, prefabrication, flexibility, portability, aggregability, environmental sustainability, environmental comfort, energy efficiency, durability, reliability, recoverability for new uses.

4 Feasibility study of a temporary structure for residential building

The project is designed to meet the needs related to the use of the living module for an average period of few years. Therefore, this system may be used to meet the needs of citizens of the world in the traditional field of architecture for temporary emergency to meet the needs associated with an intermediate phase, between the first emergency and the restoration of the situation before the tragedy or in any other area that presents similar usage time.
4.1 Concept

Observing a chest of drawers with sliding system, it was born the idea of associating a spatial unit to each drawer, so the number of spatial units can be varied in accordance with the needs, allowing considerable flexibility to the system from the distributive and functional point of view. Drawers are inserted inside a spatial grid, through sliding systems, to obtain different types of configurations. The translation of some modules, that figuratively appear like opened drawers, generates both private spaces and semi-private ones, all available to users.

4.2 Modularity and opened building

Inspired by utopias of the 60s, the structure is unlimitedly expandable, both vertically and horizontally, and allows the inclusion of a number variable of tridimensional modules. This gives rise to an opened building, infinitely expandable, with the ability to aggregate modules in low or high-density systems (storey buildings, storey buildings with accesses from balconies, tower buildings, storey buildings with accesses from gallery).

The use of a basic module of 30 cm, allows to make multi-modular choices, according to the activities that must be carried inside the tridimensional macromodule and allows to coordinate dimensionally components that make up the construction equipment.

Furthermore, the dimensional coordination generates a strong correlation between the wheelbase of the main supporting structure of the spatial grid and the macromodule. In fact, according to the dimensional variations of the macromodule will also vary the wheelbase of the main supporting structure. Therefore it will be possible to build systems with a single macromodule and a single wheelbase of the structural systems or variables systems, depending on specific needs. This choice will also affects the cost and time of production [2].

![Figure 1: High-density systems.](image-url)
The feasibility study proposed regards specifically the definition of a balcony three storey building. The supporting structure has a wheelbase of 6.3 x 6.3 m. The dimensions of each cell are 5.7 x 5.7 x 3.5 m. The connection space between two cells in correspondence with the vertical supporting structure is of 0.60 x 1.5 m. The module’s floor area is 26 sq.m and the space can accommodate either the living room, the living room with small kitchen, kitchen and bathroom, double bedroom and bathroom, two single rooms or one single room and one double room. The three-dimensional modules can be aggregated together to form accommodation of different sizes and with different conformations, depending on the needs of the users. The system, therefore, is based on set of rules that allow you to vary both the conformation of the accommodations that their aggregation as needed.

Figure 2: Multimodular choices in plan and hypothesis of change.

Figure 3: Hypotheses of aggregation modules.
4.3 The building equipment

The reading in terms of technical construction of the building organism allows us to define the relationships between the components and the role that each part performs for the purposes of compliance with specific requirements. The supporting structure is made of steel, with HEB pillars and C beams and its function is to accommodate the horizontal and vertical connections and to accommodate the modules. Each module is equipped with a sliding system formed by eight wheels with a central groove in steel, covered with rubber inserted on the main supporting beams equipped with a pin in a central position. In emergency and in case of necessity to have readily available the beams, as an alternative to C profiles that require a specific processing phase for the welding of the pin, can be used U beams placed above beams C. The module consists of a kit of prefabricated components that can be assembled in work or transported after mounting. The definition of functional layers of technological drive is starting from sustainability parameters, which are concerned about the assessment of transport, the degree of reversibility, the ecological balance, and the embodied energy and recyclability potential.

The building equipment of the module is therefore defined: the supporting structure consists of 4 welded frames, established with square steel tubular profiles (150 mm) connected by bolting by means of profiles of the same type; the lower horizontal closing consists of plywood panels with cross-laminated fibers Xlam and a floating linoleum flooring that allows easy establishment; the upper horizontal closing consists of panels of plywood fibers with cross-laminated Xlam, outside protected by a double layer of bituminous sheath, inside a plasterboard false ceiling allows the passage of the installations and the insertion of the mechanical controlled ventilation system; the vertical closing consists of OSB panels coated outside with panels in galvanized steel; the entire module is insulated with insulating cellulose fiber.

![Module axonometric projection.](image-url)
To ensure the environmental comfort appropriate checks were carried out. The module provides enough thermal comfort and optimal light comfort, do not introduce any condensation at the surface or inside the interstices. Besides, each lodge has a home automation system for lighting and dimming systems, management of electrical consume, safety and security systems.

In low-density systems the module, self-supporting and self-sufficient, is equipped with foundations punctual.

In high-density systems for foundations are used screw piles.

Figure 6: Low-density systems.
4.4 Assembly phases

Initially the tracking and the insertion of helical piles driven is carried out by the rotation imparted by the hydraulic motor mounted on the appropriate machines.

Secondly, the main carrier system is mounted. It consists of HEB pillars and double C beams and vertical and horizontal bracings.

At the third step, the vertical connections (stairs and elevator) and the cover, in part photovoltaics, are mounted.

The predisposition of the implant equipment is then drawn through a vertical distribution that includes the transfer of implants between the twin beams in correspondence of the pillar.

The mounting of the walking surface of the horizontal links has the function of end of run compartment for the module, which will be then inserted. In the next phase the module, equipped with grooved wheels, is mounted on the main beams on the ground floor, which have a greater length than on other floors.

The assembly of modules and its lifting is done in alternating spans to facilitate the construction and to balance the loads at the time of the insertion of the modules in the structure.

Figure 7: High-density systems.

Figure 8: Installing the modules on the ground floor in alternating position.
The module is hooked by means of a twist lock system and lifted by means of adequate equipments, like the frontal forklift, which doesn’t allow to handle the load laterally but only vertically, ensuring the alignment with guides on the ground floor and the correct insertion inside the rails on the upper floors. In addition, the module is perpendicularly anchored to the welded frames in order to make it more rigid when lifting. Once raised and engaged, the modules are correctly positioned by means of an auxiliary structure, mounted on the ground floor too and then raised in a way similar to the module. It is designed to transmit the pushing force to the load-bearing part of the module.

The auxiliary structure for positioning, which is constituted by four steel frames made from welded tubulars, united through similar bolted profiles and suitably braced, once used is removed.

Finally, the modules are joined where required and equipments and finishing are arranged. The whole system equipment is located inside the main support structure, horizontally distributed for each floor and connected to the individual modules. The time schedule of the working has calculated the time to build a building consisting in 15 modules, which houses 6 apartments of different sizes, namely a time equal to 2 days for each module, and equal to 2 months for the entire system.
5 Conclusions

The system introduces a new building method, that allows one to build temporary housing in a short time, very flexible among the multiple needs of users. It does not damage the soil and has requirements of comfort comparable to those of stable structures. This construction process can be used not only for building temporary housing, but also for temporary structures aimed to accommodation use, hotels and offices. The dimensions of the macromodule, the wheelbase of the main supporting structure and the materials used will change depending on the function, provided that they ensure the structural safety and comfort.

References