

Temporary Housing Respond to Disasters in Developing Countries- Case Study: Iran- Ardabil and Lorestan Province Earthquakes

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Abstract—Natural Disasters have always occurred through earth life. As human life developed on earth, he faced with different disasters. Since disasters would destroy his living areas and ruin his life, he learned how to respond and overcome to these matters. Nowadays, in the era of industrialized world and informatics, the man kind seeks for stages and classification of pre and post disaster process in order to identify a framework in these circumstances. Because too many parameters complicate these frameworks and proceedings, it seems that this goal has not been properly established yet and the only resource is guidelines of UNDRO (1982) [1]. This paper will discuss about temporary housing as one of an approved stage in disaster management field and investigate the affects of disapproval or dismissal of this at two earthquakes which took place in Iran.

Keywords—Temporary Housing, Temporary Sheltering, Disaster Management, Iran

I. INTRODUCTION

TEMPORARY housing, like any human living areas, are not just made up of houses, but also of people who live in them. It is not only physical man-made structure and a place, but also spiritual and social space, with all belongings. Therefore, a temporary house has importance not just as a shelter from the elements but also as a shelter for social, spiritual and psychological needs. Although main theories of temporary housing consider it a low-cost, temporary unit that can be provided at little or no cost (UNDRO, 1982), it shall be able to respond to a variety of spiritual and psychological needs. In order to respond these needs, temporary housing needs to receive detailed holistic planning, looked at from a system view, or it will continue to have negative effects on rehabilitation, reconstruction and development (Ellis and Barakat 1996) [2].

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II. DISASTER MANAGEMENT; TEMPORARY HOUSING; TEMPORARY SHELTERING; DEFINITION AND APPLICATION

A. Disaster Management

Disaster Management is divided in two sections pre-disaster planning and post-disaster recovery. After Disaster occurs, there are two stages- in Disaster Management Framework- for helping survivors: Relief and Recovery. The latter, has taken two parts: Rehabilitation and Reconstruction (Aysan & Davis, 1993).

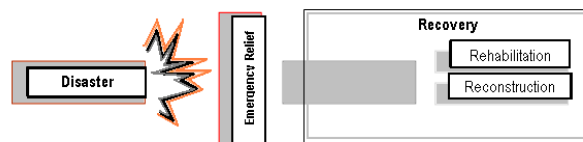


Fig. 1 Post Disaster Stages (Drawn By Author)

Habitat (1994) [3] considers this process- from Relief to Development- as a continuum. The important part of this framework is to get back survivors to their daily life, so erecting their houses would be the main goal. Program Planning should try to maximize the opportunities for the affected population to begin to regain their livelihoods. Both governments and the international community need to recognize the non-permanent influence of shelter and housing programs, for they can, only at one phase, improve the life of the affected populations. Until the end of the recovery period, however, links can be made between livelihoods and reconstruction, stimulating self-help mechanisms and coping strategies.

Settlements, shelter and housing are a very important productive asset, providing a space in which to work and rest, care for children and elderly people, store tools, allowing affected persons to concentrate on other livelihoods-related needs (UN/OCHA/ESB, 2006) [4].

B. Differences of Temporary Housing and Temporary Sheltering

There are different points of view for temporary housing. Chalinder (1998) [5] focuses on Human Needs, Engineers inform Planning is important parameter, for Architects

Designing is important and for Cuny (1983) [6] Crisis itself is the main factor which affects on local coping mechanism and organization.

The operations guidelines "Transitional settlement: displaced populations" (Corsellis and Vitale, 2005) [7] introduced this approach, following a three-year peer review process, in order to avoid confusion over the meanings of commonly used terms such as "Emergency Shelter", "Temporary Shelter", "Temporary Housing", "Permanent Housing", "Dwellings", "Housing", "Building", "Recovery", and "Reconstruction".

The opportunity to consider the relevance of these concepts and approaches to post-disaster response coincides with the opportunity to define more consistent sector terminology, after which the sector may find it easier to describe, support and integrate its contribution to wider response (UN/OCHA/ESB, 2006).

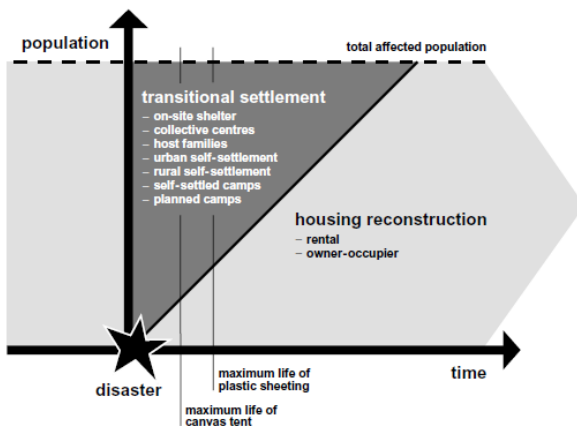


Diagram 1 from transitional settlement to housing reconstruction, (Source: Shelter Centre)

According to UN/OCHA/ESB (2006) new concepts and approaches concerning shelters are defined as:

"Shelter and housing post-disaster phase are not understood simply as a multiple of family units, but as a whole context of settlements which affects society, security, economy and environment of communities, and of their neighbors – e.g., considerations of shelter and housing do not necessarily cover schools or the sitting of entire communities away from hazards."

And, "Shelter post-disaster" is not understood as either evacuation centers or "on-site shelter", built next to damaged houses, but instead considers the full range of settlement options adopted by those affected by disasters – e.g., previous understandings of shelter do not necessarily include supporting those living with host families, self-settling in urban and rural areas, and when necessary, sitting and developing appropriate infrastructure for unplanned or planned camps."

In terms of sheltering, this usually means building tent campus in the affected area, or evacuating people to tent campus erected in accessible areas. Also, where it is possible, public buildings will be commandeered as shelters, housing

families collectively in often-overcrowded facilities. However, if possible, people will avoid these kinds of shelters if they are able to make other arrangements (Quarantelli, 1982; Drabek, 1986).

Shelter, adequate is defined as: "Immediate environment for all aspects of family life, providing protection from the elements, secure tenure, personal safety, and access to clean water and sanitation, proximity to places of employment and educational and health care facilities."

Housing is defined as: "Lodging, shelter for human habitation. The immediate physical environment is both within and outside of buildings, in which families and households live and which serves as shelter. Also, a government project to provide shelter to low-income groups" (UN/OCHA/ESB, 2006)

The distinction between housing and sheltering is made on the basis that housing involves the resumption of household responsibilities and activities in the new quarters, whereas during sheltering, normal daily activities are put on hold.

According to this classification, temporary housing can take the form of tents, prefabricated housing, mobile homes or apartments.

C. Definition of Temporary Housing

Temporary housing is a distinct and complex component of housing reconstruction. Temporary housing, without declaring about form which it takes, is the process by which people can begin to recover and restart their household chores again. Families need to reorganize their future living arrangements and meanwhile they have an affordable temporary place to live. Part of their future livings are by themselves but most parts of it is due to decision-makers programs (Johnson, 2007). UNDRO (1982) defines the temporary housing as an expensive object which is not affordable for developing countries. This is because it may cost three times higher than a permanent house.

Temporary housing can be sited on 2nd strategy of what Davis (1978) [8] defines Three Strategies about shelter following a disaster. Strategy 2 which is named "Filling the Gap", stands between "Housing Survival" and "Accelerated Reconstruction" strategies and is required when normal housing is damaged or destroyed by hazard, thus there is a gap in living accommodation caused by the destruction. This gap is filled by the provision of temporary shelter, and if the gap exists long enough, by the provision of temporary housing.

Beside of this states, the definition of temporary house and temporary shelter differs in developing countries, as in rural areas they mostly have some kind of temporary shelters for short period of time using, and they have a house for ordinary livelihood. UNDRO (1982) figure out that shelter problem in developing countries is fundamentally different from that in industrialized societies, because of many parameters i.e. meaning and definition of home, believes, culture, climate, technology, material, etc. Generally speaking, temporary housing can be defined as:

- 1) An object that the physical structure people inhabit after a disaster;
- 2) A part of a process of re-housing after a disaster;
- 3) It is a place that serves the function to shelter people during the period from the disaster until they have a permanent house (Johnson, 2006) [9].

D. Application

Temporary housing has one role in two different situations. It is used as a place to stay for short time, during weekends and after disasters.

During and after disaster in which people's home are damaged or destroyed, families must seek alternative housing until a permanent housing solution can be found. Temporary housing can be considered both a stage in process of re-housing after a disaster, as well as a physical type of housing stock used by families during the post-disaster period (Johnson, 2007) [10]. Experiences show that there are specific situations that necessitate temporary housing:

- 1) When damage to housing is considerably widespread and there is an acute shortage of interim housing possibilities (Quarantelli, 1995; Comerio, 1998);
- 2) To keep people from migrating away from the area (UN, 1982);
- 3) When there are not enough resources to build permanent housing, especially right away (UN, 1982);
- 4) When relief organizations want to show donors in the home countries that something is happening (Davis 1978). A house is a tangible product that can be photographed; people everywhere understand its importance as a basic necessity of life.

III. TEMPORARY HOUSE AS A MEANS OF DISASTER RELIEF

Post-disaster projects in relief and reconstruction can strengthen civil society organizations in a country, especially filling in gaps where governments fail. Cuny (1983) discusses how organizations must clearly establish a framework for their policies, objectives and goals to guide their decisions as to which projects to get involved in and what approaches should be taken for the selected projects.

Facing with Temporary Housing stage is the way responding to: The gap of time between relief and reconstruction; the role of temporary housing in the post-disaster recovery process; the different amounts of durability of different types of temporary accommodation; the role of governments, NGOs and aid organizations in the process of temporary accommodation; and the temporary accommodation and housing types. After disaster there is a major concern from all governmental and non-governmental organization to come over and fixes the problem. However, the Red Cross World Disaster Report (2001) [11] points out the need for research into managing the "gap" in time that exists between the relief and reconstruction period:

"There is gap: the relief stops ... often a year or more goes by between the disaster and the reconstruction. People can't wait

that long... the begin rebuilding their lives hours after disaster strikes... that is when people need technical assistance to reduce future risk" (IFRC, 2001) [12].

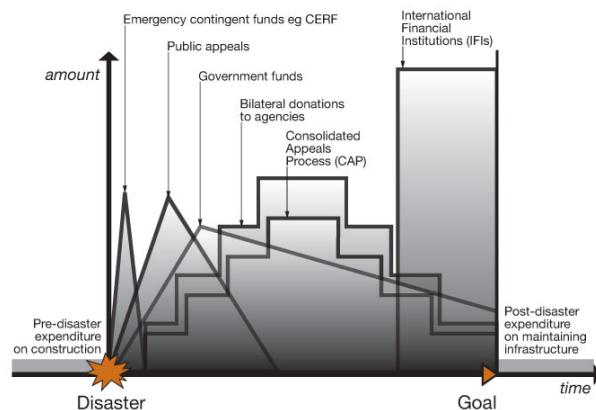


Diagram 2 Times and Amount relations during Disaster, (Source: Shelter Centre)

Temporary housing can fill this gap because it has many types though; each one has its own set of short-term and long-term implications, and some types are more suitable than others, depending on the particular disaster situation {which must people learn and have knowledge before disaster}.

In disaster research the terms housing and sheltering are often used interchangeably, with little distinction between the terms, however, Quarantelli (1995) [13] defines four stages may pass through after a disaster:

- 1) Emergency Sheltering (Within hours)
- 2) Temporary Sheltering (Within a day or two)
- 3) Temporary Housing (Preferably within weeks)
- 4) Permanent Housing (Probably within a few years)

UNDRO and Davis offer instead of taking 1-2-3 stages (Emergency Shelter, Temporary Housing, and Permanent Housing) it may be shortened to i.e. 1-3 or 2-3 routes. As, between emergency shelter provision and permanent reconstruction lies a range of intermediate options. However, the earlier the reconstruction process begins, the lower the ultimate social, economic and capital costs of the disaster (UN/OCHA/ESB 2006).

IV. TEMPORARY HOUSING IN IRAN

A. Disaster Background

The Islamic Republic of Iran is situated in south-west Asia and covers an area of 1,648, 000 square kilometers. Located on the world dry belt, 60 percent of Iran is covered with mountains and the remaining part is desert and arid lands. Due to its location, Iran is a disaster prone country. Among the 40 different types of natural disasters observable in different parts of the world, 31 types have been identified in the Islamic Republic of Iran. Major natural disasters include frequent serious earthquakes, floods, droughts, landslides, desertification, deforestation, storms and the like [14]. Earthquake is considered to be the most frequent and serious

one.

Iran is one of the most seismically active countries in the world, being crossed by several major fault lines that cover at least 90% of the country [15]. Review of the historical seismic data shows that almost all parts of the country are affected by the physical, social and economical problems associated with earthquakes.

Natural disasters are multiplying development problems across the developing world. Losses from natural hazards are expected to rise with increasing rates of urbanization and to occur in the largest metropolitan areas of the world, all located in the South (Smith 1996). Table I [16] list some of the recent losses from earthquakes (seismic activity) in Iran. The amount of damaged homes and injured people has not mentioned. As Iran sited on one of the hazardous tectonic plates, it is quite active and ground shaking most days of a year.

According to IIEES [17] 35 earthquakes have been reported from 2000 to 2009 at 5.5 to 6.8 (Richter) and 8159 earthquakes have been reported up to 5.5 (Richter). The number if earthquakes happened from the beginning of 2010 till now is 276.

TABLE I
A SELECTIVE REVIEW OF LOSSES FROM EARTHQUAKES IN IRAN [18]

Year	Total number of Deaths	Total number of Homeless	Location	Richter
2000	1	500		
2001	0	0		
2002	230	0	Northern Region, Qazvin Province	6.3
Jun. 22nd				
2003	26797	65760	Bam: An earthquake struck the historic city 1,000 km (600 miles) southeast of Tehran.	6.6
Dec. 26th				
2004	35	0	Northern Region, Qazvin/ Zanzan/ Hamadan	6.3
May 28th				
2005	625	0	Central Part of Iran, Sarayan, Qeshm	
Feb. 26th				
2006	63	0	Southwestern Iran	6
March 31st				
2008	6	0	Southern Iran, Hormozgan	6.1
Sept.				
2009	0	0		
2010	0	0	Southwestern Iran, Andimeshk	4.9
Total	27757	66260		

B. Administrative Framework for Disaster Relief

In the Government sector the disaster management mechanism is under the overall supervision of the Ministry of Interior. In 1991 the responsibilities and functions related to disasters were formally assigned to the Ministry by virtue of the Budget Act of the same year. The Ministry was mandated to deal with natural disasters which up to that time were discharged by a special disaster task force within the Office of the President. To discharge the assigned disaster management functions, the Ministry formed the Bureau for Research and Coordination of Safety and Reconstruction Affairs (BRCSR) [19]. The BRCSR mandate was quite broad and included research into safety measures, formulation of preparedness and mitigation plans, disaster information collection, analysis

and dissemination, provision of coordination services for relief, reconstruction and rehabilitation activities, monitoring activities including coordination of budget forecasting and disbursement and provision of logistical and procurement support services for the provinces. The BRSCR was also mandated to liaise with international and national centers to utilize their potentials to achieve its given mandate. The Ministry also formed a National Disaster Task Force (NDTF). As the name suggests the NDTF is a coordinating inter-organizational body whose activities vary during different phases of disasters. When a sudden disaster strikes, the NDTF assumes the major task coordinating relief operations carried out by technical ministries and relief organizations [15].

V. AFTER-DISASTER TEMPORARY HOUSING EXPERIENCES IN IRAN

As noted by Buist and Bernstein (1986), in the past five centuries, earthquakes caused more than 5 million deaths—20 times the number caused by volcanic eruptions. In a matter of seconds or minutes, a large number of injuries (most of which are not life-threatening) require immediate medical care from health facilities, which are often unprepared, damaged, or totally destroyed.

A. Ardabil Earthquake

The 1997 Ardabil earthquake was a destructive earthquake that occurred on 28 February 1997. The epicenter was located near the city of Ardabil in northern Iran. The earthquake occurred at 12:57 UTC (4:27 p.m. Iran Standard Time) and lasted for 15 seconds [18]. At least 1,100 people were killed, 2,600 injured, 36,000 homeless, 12,000 houses damaged or destroyed and 160,000 livestock killed in the Ardabil area of northwestern Iran. Given the large scale devastation caused by the earthquake, it was almost impossible for the affected communities to be able to move to their permanent houses soon. Tents that had been provided as temporary shelter following the earthquake served as good emergency shelters [20].

B. Lorestan Earthquakes

On 31 March 2006, a series of earthquakes with the strongest shock measuring 6 on the Richter scale (according to Iran Geophysics Center) struck southwestern Iran and affected Borujerd and Dorud districts in Lorestan Province. Fortunately, the foreshocks that happened early in the evening and night of 30 March and the campaign by the government authorities alerted people to be able to quickly leave their houses.

The I.R. Iran National Disaster Task Force (NDTF) and Ministry of Interior reported a death toll of 63 with some 1418 people injured. Nearly 320 villages experienced damages from 10% to 100%, while 60 villages were completely destroyed. The initial assessment conducted by NDTF and the Housing Foundation of the Islamic Revolution indicates that around

33,000 buildings are damaged by over 50% in the eight affected cities and 320 villages. Around 6000 animals (livestock), the main source of income for the people who live in rural areas was lost.

In response to the earthquake that occurred at 04:47 on 31 March the first Rescue and Relief teams and Assessment Teams of the provinces were deployed by 05:02 to report on the extent of damages and assistance required. Auxiliary Search, Rescue and Relief teams and other assistance from Semnan, Esfahan, Hamedan, Kermanshah, Illam, Markazi, Khoozestan and Chaharmahal-Bakhtiyari Provinces were requested. Search and Rescue operations were completed by 11:00 of 31 March.

A total 52,200 tents were distributed. Lorestan Province Task Force entrusted the responsibility of distributing the tents for emergency shelter to the Basidj (Mobilization Forces). The need for provision of emergency shelter was based on the amount of damage; hence the villages were grouped into three priorities of more than 60% damage as the first priority, between 30% to 60% damage as the second priority and finally less than 30% as the third priority. From the third day the IRCS was once again involved in the distribution of tents in the villages of Dorud and Borujerd Townships through its 13 operational bases.

In collaboration with the Basidj and Governors' Bureaus for Khoramabad and Alashtar Townships, IRCS completed the distribution of tents in the villages of 2nd priority area by the 4th day of the disaster and in the 3rd priority area by the 12th day.

Since the extent of damages in cities was not very considerable, tents were not distributed in the cities of Khoramabad and Dorud. However, at the insistence of local authorities and the ratification of the Parliament and the Task Force, 3050 tents were given to the municipality of Borujerd for distribution [21].

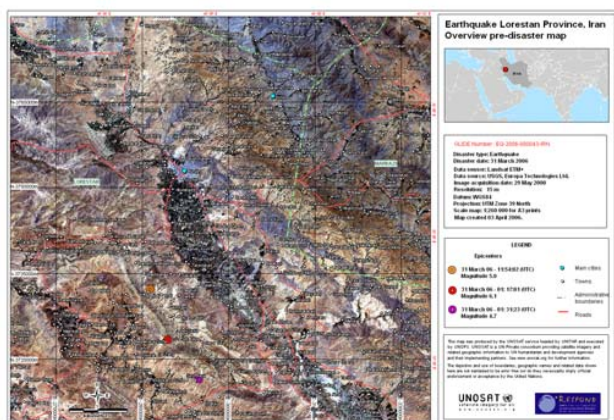


Fig. 2 Map of Lorestan Province Iran- overview pre-disaster map [18]

C. Temporary Housing at Ardabil and Lorestan

After these two earthquakes, the government decided to conceal temporary housing stage and take instantly to permanent housing construction.

Situation when disaster happened, Lorestan

- Having hot and dry climate.
- Quake occurred in spring.
- Potential of building and erecting by survivors living in the affected area.
- Communicating and participating among families and relatives on securing and supporting each one.

Concealing Temporary Housing Stage at **Lorestan** was due to [22]:

- Quake occurred at the beginning of spring, so there was suitable condition for reconstruction process;
- There was unaffordable experience and unsolved problems from past quakes like Bam (although it was mostly referred to temporary settlements not temporary housing);
- Reducing the cost of reconstruction process by omitting this one;
- Giving a chance to rebuilding permanent houses as soon as possible;
- Encouraging people to catch recovery process.

Table 2 shows interaction between decisions and results during earthquake.

TABLE II
SUMMARIZED OF DIS/ADVANTAGES OF CONCEALING TEMPORARY HOUSING

Advantages	Disadvantages	Solution Accepted by People
Time of beginning rebuilding the permanent house was faster than previous ones.	Survivors stayed at emergency shelters. The situation was not affordable and suffered many hard problems. These are mentioned as:	
	The weather was so hot and oppressive during summer.	Most survivors living rural area built themselves wooden shelters.
	There was lack of space inside tents.	survivors enlarged their living area by adding wooden infrastructures, enclosures, etc.
	Tents acted as emergency and temporary shelters without any living considerations and architectural aesthetics'.	
	Reconstruction process became a 2- year project and survivors stayed through tents, all day longs.	Most of survivors erect their self-built temporary shelters with vernacular material, techniques and architecture.
	Survivors have not taken a chance to participate on their houses design and construction.	
	The new houses were not much affordable by people who aimed to live in there.	The process of housing has not finished yet. Whenever it is possible, people change the face of houses in order to being familiar to a home they known before.

(According to Reports. Drawn By Author)

Situation when disaster happened, Ardabil

- Having very dry and climate.
- Quake occurred in winter.
- High communicating and participating among families and relatives for securing and supporting each one.

Concealing Temporary Housing Stage at Ardabil was due to:

- Reducing the cost of reconstruction process by omitting this one;
- Giving a chance to rebuilding permanent houses as soon as possible;
- The high extent of damaged and affected areas forced governors' to decide quickly;
- The very cold climate of region and its forces to begin construction phase;
- Encouraging people to catch recovery process.

TABLE III

SUMMARIZED OF DIS/ADVANTAGES OF CONCEALING TEMPORARY HOUSING

Advantages	Disadvantages	Solution Accepted by people
Time of beginning rebuilding the permanent house was faster than previous ones.	Survivors stayed at emergency shelters. The situation was not affordable and suffered many hard problems. These are mentioned as: It was a hard cold weather. There was lack of space inside tents. Reconstruction process became a 2- year project and survivors stayed through tents, all day longs. Tents could not support and maintain survivors from the cold weather.	Some leaved away without notifying disaster managers for some time. This caused problem during recovery process. Survivors enlarged their living area by adding enclosures. Most of them established emergency shelters inside their yards, near their properties. Survivors self-built a temporary accommodation or shelter but it was not supported them. Survivors covered tents by anything, adding some kind of structures, but not successful on protecting themselves from the cold.
The high extent of damage and affected areas forced governors' to decide quickly.	Although they have experience from pre disasters but, many decisions taken without pre-studies.	
Government took only leading on control programs and infrastructures, because of extent of earthquake and affected regions.	Hurried on rebuilding permanent house, omitted many most important parameters on design a house.	The new houses were not much affordable by people who aimed to live in there. People changed their house gradually.

(According to Reports, Drawn By Author)

Advantages	Disadvantages	Solution Accepted by people
Survivors do participate only on relocation decision which had difficulties, though.	Survivors have not taken a chance to participate on their houses design and construction. The new house didn't fit to their needs.	Survivors have taken both old and new villages. They prefer homes before earthquake. It had enough place to work, stay, store and live and also, equipments and space they needed.

VI. CONCLUSION

After any natural or man-made disaster, temporary shelter for the affected families has always remained the major issue.

Damage to housing and other buildings has been the most severe consequence after any disaster. Temporary housing and construction gives an opportunity to meet the urgent needs of families which are affected by disaster. Moreover, the hindered the maximization of the opportunity given by the disaster itself to be turned out sustainable redevelopment due to their negative impacts in long-term effects. After Lorestan and Ardabil earthquake, there were rapid wants/needs for rebuilding and reconstruction. Decision-makers concealed the temporary housing stages without sharing these ideas with survivors and experts. This decision aimed to maximize the speed of construction but because of parameters it didn't happen within the next two years; so, it encountered problems. Factors like climate condition (Lorestan has a very hot and Ardabil has a cold climate), time duration of housing process (which took longer than their expectation) and the scale of people participation (which concealed during recovery process) had effects on reconstruction process. Communicating with survivors and participating on decisions might lessen these effects and allowing them to decide about their future living areas. If survivors themselves had the opportunity to decide living in temporary houses or building their own house right away, they had time configuring what the needs and forms of their house would be.

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