Iscarsah
International Scientific Committee on the Analysis and Restoration of Structures of Architectural Heritage

18-19-20
newsletter
April-August-December, 2018

ICOMOS
International Council on Monuments and Sites
Conseil International des Monuments et des Sites

Figure 1- Kastamonu.

Figure 2- Mahmut Bey Mosque.

Message of the President of ISCARSAH Görün Arun

Dear Friends and Colleagues,
This year we had three activities. ISCARSAH Turkey organized a ICOMOS Inter-ISC'18 Colloquium on "Anti-Seismic Vernacular Heritage of Anatolia and Beyond" during 10-13 July 2018 in Kastamonu, Turkey. Kastamonu is a city famous with its traditional Turkish wooden houses (Fig. 1). As technical tour, we visited a 650 years old timber Mahmut Bey Mosque (Fig. 2) and Safranbolu, the town inscribed as UNESCO World Heritage in 1994. The members of ISCEAH, IIWC, CIAV, ICORP, ISCARSAH, CIVVIH, ISCES, ISCS and CIPA attended this event. ISCARSAH had its business meeting on 10 July 2018. Proceedings of the Colloquium is published (ISBN: 978-605-245-789-4) and is available in ICOMOS website.

ISCARSAH had its annual meeting on September 10th, 2018 in Society of Professional Architects of Cusco (Colegio de Arquitectos de Cusco) (Fig. 3) during SAHC2018 Conference. During the meeting Honorary member Pere Roca, chair of the task group on ISCARSAH Guidelines, introduced the initial draft of the ISCARSAH Guidelines. The discussions on the draft were very fruitful.

Figure 3- ISCARSAH meeting in Colegio de Arquitectos de Cusco.

ICOMOS-ISCARSAH had a training and workshop on "Restoration and Strengthening of Historical Structures"; on 20-22 October 2018 in Tehran (Fig. 4) and 23-28 October workshop included eleven historic sites in different parts of Iran. The event was organized by ICOMOS-ISCARSAH and Deputy Head of Iran's Cultural Heritage, Handcrafts and Tourism Organization (ICHHTO).

Figure 4- Training for the Architects and Engineers of Miras.

And another seminar on "Restorationsand Strengthening of Historical Structures" was organized on 29 October 2018 in Isfahan, Iran.

During the workshop, after visiting the monuments in Tehran, the group was divided into two. Group A visited Ala-o-doleh Mausoleum in Semnan, Old Bridge in Dezful (Fig. 5), Prophet Danial Mosoleum and Shoushtar Castel of Darius in Shoush, Shouster water structures (Fig. 6) in Shouster, Dokhtar Castle, Firouzabad fireplace, Tower of Shahr-e-Gour and Sarvestan Castle in Shiraz.

Figure 5- Old Bridge in DezfuL; Figure 6- Shouster water structures.

The group B visited Grand Mosque of Qazvin (Fig. 7) and Grand Hotel in Qazvin, Soltanieh Dome in Sultaniyeh (Fig. 8), Grand Mosque, Abbas Abad and Queen Esther tomb in Hamedan, and Falak-ol-Aflak Castle, Kashkan bridge, Dokhtar bridge and Gavmishan bridge in Khorrmabad. On 28 October, some

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members of the two groups met in Isfahan. After the seminar, this group visited Naqsh-e-Jahan Square and Sio-she-pol bridge. We thank our expert member Mehrdad Hejazi for spearheading the development of the training course, workshop and seminar.
This year the Reports of ISCARSAH Workshop in Korea, on the scope of the material and techniques; Stone, Wood, Earth is published by National Research Institute of Cultural Heritage and ICOMOS Korea (ISBN 978-89-299-1380-9 93600) and available in ICOMOS website.
The demise of our Expert member, professor Gennaro Tampone at the age of 81 deeply saddened us. Professor Tampone, who chaired the ICOMOS International Wood Committee as Present from 2005 to 2016, will be remembered by all for his invaluable contribution to the conservation of wooden heritage.

E. Görün Arun
ISCARSAH President

Figure 7- Grand Mosque of Qazvin.

Figure 8- Soltanieh Dome in Sultaniyeh.

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Authenticity and Integrity of Architectural Heritage

Three Cases of Historic Houses and Human-caused Disasters in Seoul

Trilogy of Relocation, Intervention and Adaptive reuse with a focus on the Residence of *Han Gyu Seol*

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Abstract

The three traditional houses of case studies were originally in the same historic area in Seoul, Republic of Korea.
When these houses were on the verge of demolition due to the dramatic urbanization of the central Seoul, they were partly relocated with dismantle and reassemble technology or totally destroyed: the first case study of the Residence of *HAN Gyu-Seol* deals with the issues of relocation of cultural heritage sites from their original sites, intervention and adaptive reuse of a historic house as an opportunity to conserve the heritage architecture.
The three main focus areas of this case are:
- firstly, review of history of the house and its challenges at the time of urban redevelopment and its designation as a heritage;
- secondly, the documentation, anastylosis or dismantling and reassembling, and additions of structures on the new site;
- thirdly and lastly, adaptive reuse of the Hanok to promote Korean traditional tea culture and heritage architecture; the second case study of the *YI Seung-Eop* House deals with the issues of anastylosis of a historic house as an opportunity to conserve the heritage architecture.
The three main focus areas of the second case are:
1) review of history of the house and its challenges at the time of relocation;
2) reconsider the anastylosis or dismantling and reassembling, and loss of structures on the new site;
3) reassess the *Hanok* restoration to promote Korean traditional heritage architecture; the third case study of *ShinMunGwan* and *JoseonGwangMunHoe* discusses rebuilding of a historic architecture as an opportunity to critique the past as well as to unearth its merits.
The three main focus areas of last case are:
1) review of the history of *JoseonGwangmunhoe* and its HQ *Hanok, Shinmungwan*;
2) reconsideration of the challenges at the time of demolishing;
3) reassessment of the rebuilding of *Hanok* to recover the past and to promote the principles of integrity and authenticity.

Key words: Hanok, Authenticity, Integrity, Relocation, Intervention, Adaptive reuse

1. Understanding *Hanok*

1.1 Grammar of Hanok

Hanok is the indigenous house for Koreans, and continues to be built in Korea to this day with proper materials - earth, wood, and the stones from the very nature we are living in; with techniques handed down to us through generations; and based on a sound structure of column and beam with mortise and tenon joints that create aesthetic beauty. As a result of sound and rational structure, a beautiful eave-line is created.
In other words, the site location, the natural environment, its local materials and traditional techniques are the basic elements for a *Hanok*, the house of Korean wooden structure. The inherent grammar of sustainable *Hanok* involves the following:
firstly, the characteristics of spatial compositions of building–courtyards–enclosed wall, warm heated floor room "*Ondol-bang*", cool wooden floor hall "*Dae-cheong (maru)*" and raised floor "*Nu (maru)*" are enclosed by the front and rear courtyards which are again enclosed by the wall;
secondly, the scientific characteristics which is comparable to green growth and environmental theory of present days. During hot summer, cool breeze blows through the wooden floor hall circulating the cold air of the backyard and hot air of the front yard, on the other hand, during the cold winter, warm and cool air convection in the warm heated room "*Ondol-bang*"; thirdly and lastly, the inherent authenticity of the house which is accordant of materials, techniques, structures, and concepts.
In the facade there are three components of 1) raised platform, 2) columns, door and windows and walls and 3) roof on the wooden structure.
To support this statement, we will examine basic information on the Korean environment, natural and social environment.

1.2 Environment

- Natural environment

70% of the land in Korea is mountainous. However, most of the land is relatively low, as typically seen in aged terrain. With these geographical characteristics, villages and individual dwellings formed with mountains to the back and rivers to the front. The mountains not only protected houses from the wind but also supplied firewood. The river provided drinking water and agricultural irrigation.
The climate in Korea is moderate. The south easterly wind blows on summer while the dominant wind in wintertime is the north westerly. The South Korea climate in winter is normally long, cold and dry and in summer is humid, hot, and short. Due to this duality in the climate of Korea, two contrasting floor structures of heated floor room and wooden-floor hall in a house appeared.

- Social and cultural environment

Throughout the history of Korea, theories of Yin-Yang-and-five-elements School, *Pungsu* (*Fengshui* in Chinese[1]), Buddhism, Confucianism, Taoism and other philosophies left a lasting imprint on the process of housing evolution.
The principles of Confucianism have dictated family and social lives in Korea. Confucian theories spawned a strong patriarchal family system in Korea and out of this came the tribal village formed of patriarchal blood relations. Ancestor worship and hospitality is the core of sacred obligation in a

family. People erect separate family shrines in their homes and provide a guest room in the men's quarter. Since Confucianism called for the separation of the genders, the women's quarters were detached from the men's.
As the house protects humans from severe weather and provides a resting place, *Hanok* is the most appropriate architecture considering the geographical and climatic features of Korea.

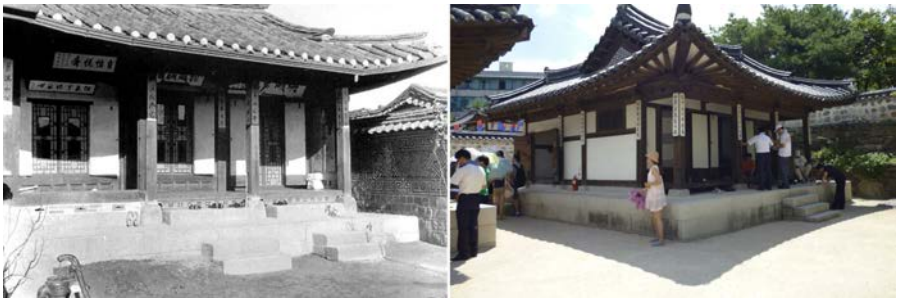
2. Trilogy of relocation, intervention and adaptive reuse[2]

2.1 Trilogy-1[3]

Trilogy-1, the case study of the Residence of *HAN Gyu-Seol*, deals with the issues of relocation of cultural heritage sites from their original sites, intervention and adaptive reuse of a historic house as an opportunity to conserve the heritage architecture.
The three main focus areas of this part are: firstly, review of history of the house and its challenges at the time of urban redevelopment and its designation as a heritage; secondly, the documentation, anastylosis or dismantling and reassembling, and additions of structures on the new site; thirdly and lastly, adaptive reuse of the *Hanok* to promote Korean traditional tea culture and heritage architecture.

2.2 Trilogy-2

Trilogy -2, the case study of the *YI Seung-Eop House*, deals with the issues of anastylosis of a historic house as an opportunity to conserve the heritage architecture.
The three main focus areas of the study are:
1) review of history of the house and its challenges at the time of relocation;
2) reconsider the anastylosis or dismantling and reassembling, and loss of structures on the new site;
3) reassess the *Hanok* restoration to promote Korean traditional heritage architecture.
Historic House of *YI Seung-Eop*, one of the Major Carpenters employed by Regent of Korea *DaewonGun* (1820-1898, r 1863-1873) was first built during the reconstruction of the Main Palace *GyeongBokGung* in the 1860's. Designated as Seoul's Folklore Heritage No. 20 in 1977 and originally located in *SamGak-Dong*, *Jung-Gu*, Seoul, Korea, it



Historic House of YI Seung-Eop, before dismantling, anastylosis, dismantling and reassembling.

The YI Seung-Eop House, NamSangol Hanok Maeul.

ShinMunGwan and JoseonGwangMunHoe, 1969.

was relocated to the present site of *Namsangol Hanok Maeul*, known as "A Village of Traditional Houses in the Namsan Valley" as part of Namsan Neighbourhoods' Reviving Project of Seoul in 1990s. The dismantling and reassembling technologies were adapted to the relocation project of this house. The original house showed a typical middle class *Hanok* (Korean traditional house compound in wooden structure) in Seoul. Its' details explain the intangible heritage of major carpentry work of the late Joseon Dynasty. The present house is composed of *Sarangchae* (master's quarters) and *Anchae* (wife's quarters) only. The various courtyards, guest quarters, gates and walls, storages, and *Haengrang* (servants' and service quarters) were missing, unfortunately, when it was restructured.

2.3 Trilogy-3[5]
Trilogy-3, the case study of *ShinMunGwan* and *JoseonGwangMunHoe*, discusses rebuilding of a historic architecture as an opportunity to critique the past as well as to unearth its merits. The three main focus areas of the study are:
1) review of the history of *JoseonGwangmunhoe*, Society of the Enlightenment Movement, and its HQ Hanok, *Shinmungwan*;
2) reconsideration of the challenges at the time of demolishing (human-caused disaster);
3) reassessment of the rebuilding of Hanok to recover the past and to promote the principles of integrity and authenticity.
Shinmungwan, a Historic *Hanok* was a printing and publishing company since 1907 and the HQ of *JoseonGwangmunhoe*, the Enlightenment Movement Society. This site was known for a wide range of activities at the beginning of the twentieth century Joseon: the Korean Classics were first published there; the term *Hangeul* for the Korean alphabet was coined and its use as a literary medium was promoted; the compilation of the first dictionary of the Korean language and the Encyclopedia of Korean History were initiated; the Korean Declaration of Independence was written; and Korean identity as a cultural entity was established.

The building was in *Samgak-dong*, *Jung-Gu*, Seoul, Korea. Remaining photographs and records show a unique double storey *Hanok* faced an alleyway and presumably typical inner residential quarters. In 1969, due to the dramatic urbanization of the central Seoul, it was demolished without considering the future of the past, even before the designation as a cultural heritage site.
Though the neighborhood has been changed, a reconstruction plan took off on the same site initiated by private governance.

3. Challenging authenticity and Integrity

The Residence of *HAN Gyu-Seol*: Relocation, Intervention and Adaptive reuse.
The Residence of HAN *Gyu-Seol* or *Myungwon* Folk House of Kookmin University, Seoul was originally located in *JangGyo-Dong*, *Jung-Gu*, Seoul, Korea.
It was first built at the end of 19th century and the Residence was occupied by *HAN Gyu-Seol* (1848-1930), the mayor of Seoul and the minister of Political affairs during the late Joseon Dynasty (1392-1910).
At the turn of the century Korea, the owner has been changed and the usage also has been varied from the original purpose as a residence of the mayor of Seoul. Later at the end of 1970's, the owner's family during the urbanization period presented it to the Lady Tea *Master KIM Mee Hee* (1920-1981). Lady *KIM Mee Hee* was the wife of the President of SsangYong Conglomerate and the owner of the Kookmin University at that time. To conserve the historic architecture, the City of Seoul came to designate it as a cultural heritage on 17 March 1977 as "Seoul Folklore Cultural Heritage No. 7"[6].
It was however relocated shortly after, when it was on the verge of demolition due to the dramatic urbanization of the central Seoul, it has been decided to relocate to the present site, using the inherited traditional dismantling and reassembling technologies.

3.1 History of the house
The inherited traditional dismantling technologies were carefully applied to the residence. Skilled roof tile technician, major carpenters and minor carpenters, and stone mason worked on it. Careful dismantling work carried on from the clay roof tile through the wooden structure to the mud walls and stone platforms.

The Residence of HAN Gyu-Seol.

During dismantling, manuscripts were founded on the hidden parts of wooden structure.
It revealed the original history of the residence.
One quarter was built in 1853 and the other 1871.
Until this dismantling work, the record showed that it was presumably built ca. 1890.

3.2 Relocation
In 1980, after dismantling work, it was relocated to the present site, adjacent to *Kookmin University*, *JeongNeung-Dong*, *SungBuk-Gu*, Seoul, using the inherited

Heritage Classification (the Cultural Heritage Protection Act, CHA, Korea, amended on Aug.4. 2016)

	City-/Do- designated Heritage	*State- designated Heritage*
Designated Cultural Heritage	Tangible Cultural Heritage	National Treasure
		Treasure
	Monuments and Sites	Historic Sites
		*Historic and Scenic Sites
		Scenic Sites
		Natural Monuments
	Folklore Cultural Heritage	Important Folklore Cultural Heritage
	Intangible Cultural Heritage	National Intangible Cultural Heritage
Cultural Heritage Resources		
Registered Cultural Heritage: Cultural Heritage of early modern Times		
Undesignated Cultural Heritage	General Movable Cultural Heritage	
	Buried Cultural Heritage	

Chart design by Cho In-Souk

The term "designated cultural heritage" in this Act means the following: 1. State-designated cultural heritage; 2. City/Do-designated cultural heritage - Cultural heritage designated by a Special Metropolitan.

traditional reassembling technologies in opposite procedure of dismantling. And some necessary architectural intervention carried out in the compound.

The Residence of HAN Gyu-Seol.

Main quarter, so called lady's quarter and the family ancestors' shrine were completed.
Master's and guest quarter and interiors were completed as well as gates and various courtyards were completed. The present house is composed of *Sarangchae* (master's quarters), *Anchae* (wife's quarters), *Byeoldang* (detached special quarters), *Sadang* (family ancestors' shrine), *Haengrang* (servants' and service quarters), the main-, inner- and rear gates and various courtyards.
The spatial organization of the various inner courtyards shows the hierarchy of living spaces for a distinguished member of the Joseon Society very well and therefore is currently recognized as an archetype of an upper class *Hanok* in Seoul.
Hanok is the organic house of Korean wooden structure.

3.3 Intervention

Major Intervention carried out on the site. An artificial reflective pond as well as a Tea Pavilion and a *Chodang* (thatched-roof cottage) were added in the southern edges of the present site when it was restructured. After relocation and intervention, only the relocated area from the original site is the designated Heritage, the additional structures outside the compound are not included in the heritage protection area based on the Korean Cultural Heritage Protection Act because of the Authenticity.
A two (2) - kan Tea Pavilion and a *Chodang* (thatched-roof cottage) and The main gate structure and service quarters were added.

3.4 Adaptive Reuse

The house is being utilized as a space for the education and research of the traditional Korean Tea Culture and *Hanok* architecture. The *Myungwon* Tea Society spearheaded University Tea Culture movements.
Myungwon is the pen name of the Lady *Kim Mee Hee*, the wife of the owner of *Kookmin* University at that time. The *Myungwon* Tea Society organized in 1981. In 1982, an elective course on the tea culture as part of the official

curriculum for the first time in Korean Universities commenced and has been very successful until now.
This small pavilion and the reflective pond show the characteristics of *Hanok* architecture as well as the notions of understanding the relationship between the nature and human beings.
The Pavilion has two of its "legs" immersed in water. This can be understood as a means to personify an image of the ancient sages who would seek to cool off during the summer by dipping their feet into a mountain stream's cool waters. Usually, ponds were created based on the notion of *Cheon-won-ji-bang*, under which it is thought that "the sky is round and the earth is square," and the relationship of water and fish that is often compared to that of the king and his subjects. These design considerations were related to scientific principles that allowed the water to circulate and not stagnate. But this pond is irregular shape followed the natural topography.
Regarding this relationship between the nature and human beings, there is a beautiful poem written by a 16th Century scholar poet, *Song Sun* (1493-1583)[7]:

- ten years -

It took ten years to build
My little thatched hut.
One part is for me, the moon fills the second,
The third is reserved for the clear wind.
Rivers and mountains: There is no room to invite you in!
Stay where you are, I'll gaze at you surrounding me.

(Translated by CHO In-Souk and edited by Prof. Dr. Young-Key Kim-Renaud)

Conclusion

This suggests a further consideration on authenticity, integrity of the architectural heritage in the rapid changing Metropolitan City of Seoul as resources for the continuity of architectural heritage.

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The Residence of HAN Gyu-Seol.

Notes

[1] The term '*Feng Shui*' comes from a Chinese phrase that means "shutting in the wind (that blows life force away) and obtaining the water (that energizes it)."
Called by a few other names in Korea meaning the 'jiri (advantage of locality)', or 'jisul' (art of locating dwellings), *Feng Shui* considers earth as having life force that is present not only on Earth but throughout the whole universe, creating everything under the sun.
[2] I did research work on it and submitted the papers through the call for paper procedure. Fortunately all three proposals were taken to present in various occasions of the international scientific symposium.
[3] The 1st paper was taken to oral-present at the 50 years anniversary of ICOMOS Scientific Symposium in Warsaw, June 2015.
[4] The second one was taken as a poster presentation at the ICOMOS Administration Committee Scientific Symposium in Fukuoka, October 2015.
[5] The third one was taken as a poster presentation at the ICOMOS Administration Committee Scientific Symposium in Istanbul, October 2016.
[6] Heritage Classification in Korea: The residence belongs to the Folklore Cultural Heritage designated by Metropolitan City of Seoul. Based on the Article 2 (Definitions) (2) of Cultural Heritage Protection Act (CHPA).
[7] This poem is one of the good examples to show the notions of understanding the relationship between nature and human beings in terms of Korean traditional architecture.
After the poet Song Sun retired from his long-term position as a government official, he built a humble three room pavilion on a hill above his home village. He took such a long time to finish the construction. Such a long time described as "ten years" in the poem.
He shared the pavilion together with fresh wind and warmish moonlight.
The three-room hut was too small to let the mountains and streams in.
Thus he shall leave them around the hut and appreciate it as it is.

Empirical approach for evaluating earthquake safety of Tirana Ethem Bey Mosque

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1. Introduction

Safety evaluation of historic buildings is very complex task because of their long life and inclusion of many layers from different periods. Based on materials used, geometry of the building, structural system and its elements safety evaluation procedures vary. Safety evaluation of historic buildings is rather different than the new constructions in terms of the methods used and the expected results. The emphasis of safety evaluation of historic buildings is to determine the purpose and time limit for conducting the analysis, the budget, and suitable method for the expected results [1, 2]. The main aim is to find possible weak parts and elements of the structure and potential of damage mechanisms [3]. The complexity and difficulties of safety evaluation of historic buildings may be listed in general as [4 - 6]:

- Uncertainties and lack of information / documentation about the construction and structural behavior of the building;
- Lack of information about construction details and joint solutions;
- The fact that many layers are included uncertainty about mechanical and material properties;
- Uncertainty about interventions / retrofit works had been made during the course of the time;
- To not have codes and regulations specific for historic structures as it is existed for the new constructions;
- And the like.

There are many methods of safety analysis of historic structures such as laboratory models, numerical models and analytical studies etc. One of the simple and first step evaluation methods is to use empirical approach to get an initial idea about the building behavior in order to decide a suitable method for the safety analysis. Accordingly, the aim of this study is to rise the empirical approach as a first step of safety evaluation of historic buildings.

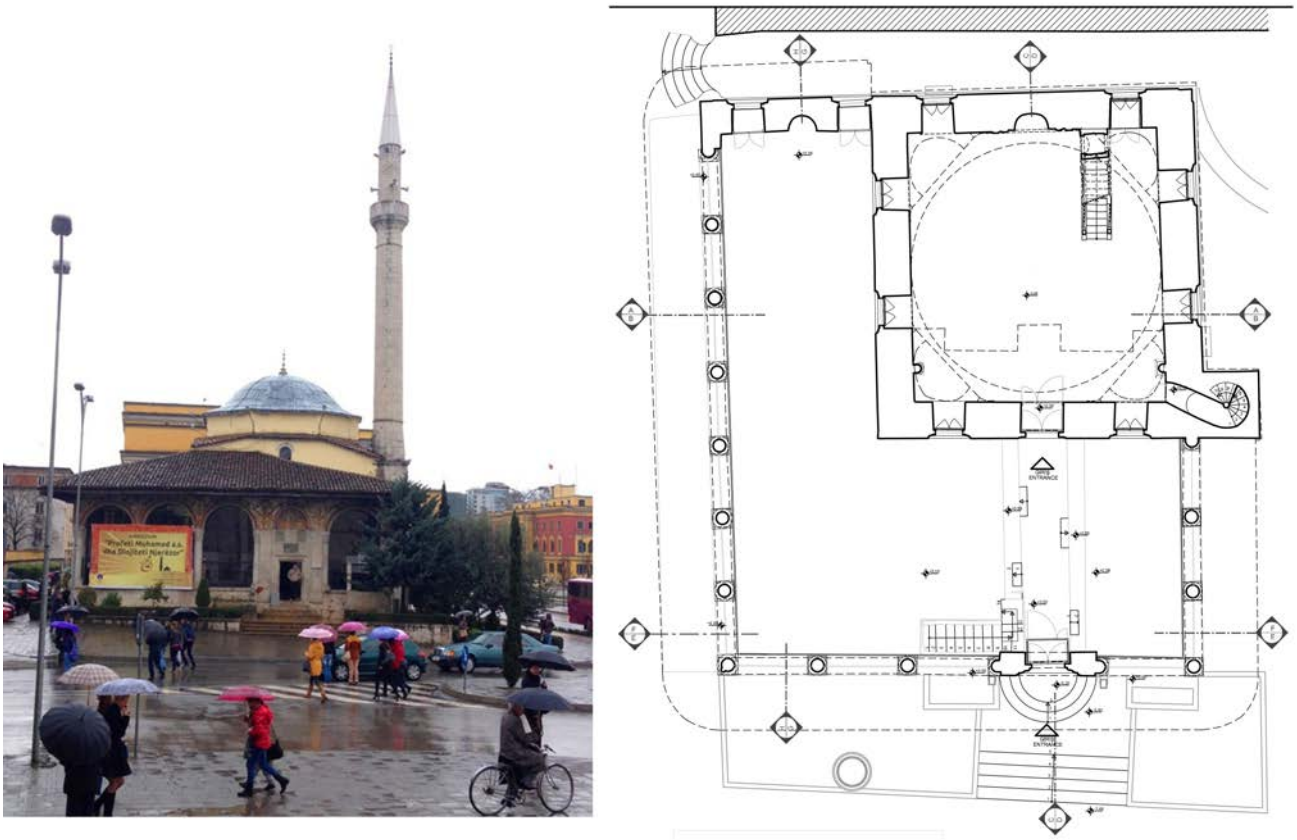

Figure 1: Ethem Bey Mosque.

Tirana Ethem Bey Mosque is chosen as a case study.

2. Case study: Tirana Ethem Bey Mosque

2.1. Architectural Characteristics and Building Geometry

Ethem Bey Mosque is located in Tirana – Albania and it was built in 1793 and restored in 1822 [7]. It was converted into a museum in 1967 and re-used as a mosque in the 1990s [8]. Ethem Bey Mosque has a single-domed square plan (Figure 1). The women's part (separated from the vision and common use with the men) is organized as a mezzanine floor sitting on two circular columns and reached by the staircase which leads to the minaret as well. The outer praying area (son cemaat yeri) has an L shape and it is located in the north and east of the mosque, adjacent to it. The minaret is built adjacent to the western wall of the mosque.

The main dome of the mosque has a hemisphere geometry, 822 cm in diameter and 453 cm in height (internal measures are taken). The thickness of the dome is 38 ~ 40 cm on the top and it increases towards the down where it is supported (Figure 2). Transition from the dome to the square geometry is achieved via squinches sitting on the octagonal hoop.

The main walls, 120 cm thick, are made of clay stone and limestone [9]. There are also 40 ~ 44 cm diameter stone pillars under the women's praying area adjacent to the main wall.

The minaret of Ethem Bey Mosque is adjacent to the building sitting on its square base, passes from the square base to the circle at the elevation of +10.00 m. Until the elevation of +27.3 m the diameter of the minaret is decreasing from 140 cm to 110 cm and its thickness varies from 12 cm to 16 cm [10]. The material of the minaret is stone and only the cone roof is made of wood. Although there is not a complete basement in the structure, the wet space was added at a later period just below the open praying area.

2.2. Seismicity of the City of Tirana

Seismic data on Tirana and its immediate surroundings, which are located 100-140 m above sea level in the Adriatic plain, are very limited. The most important locally recorded earthquake in Tirana is 5.4 (ISC) and 7-8 (MSK - 64) magnitude on the

Figure 2: Cross section of Ethem Bey Mosque [11].

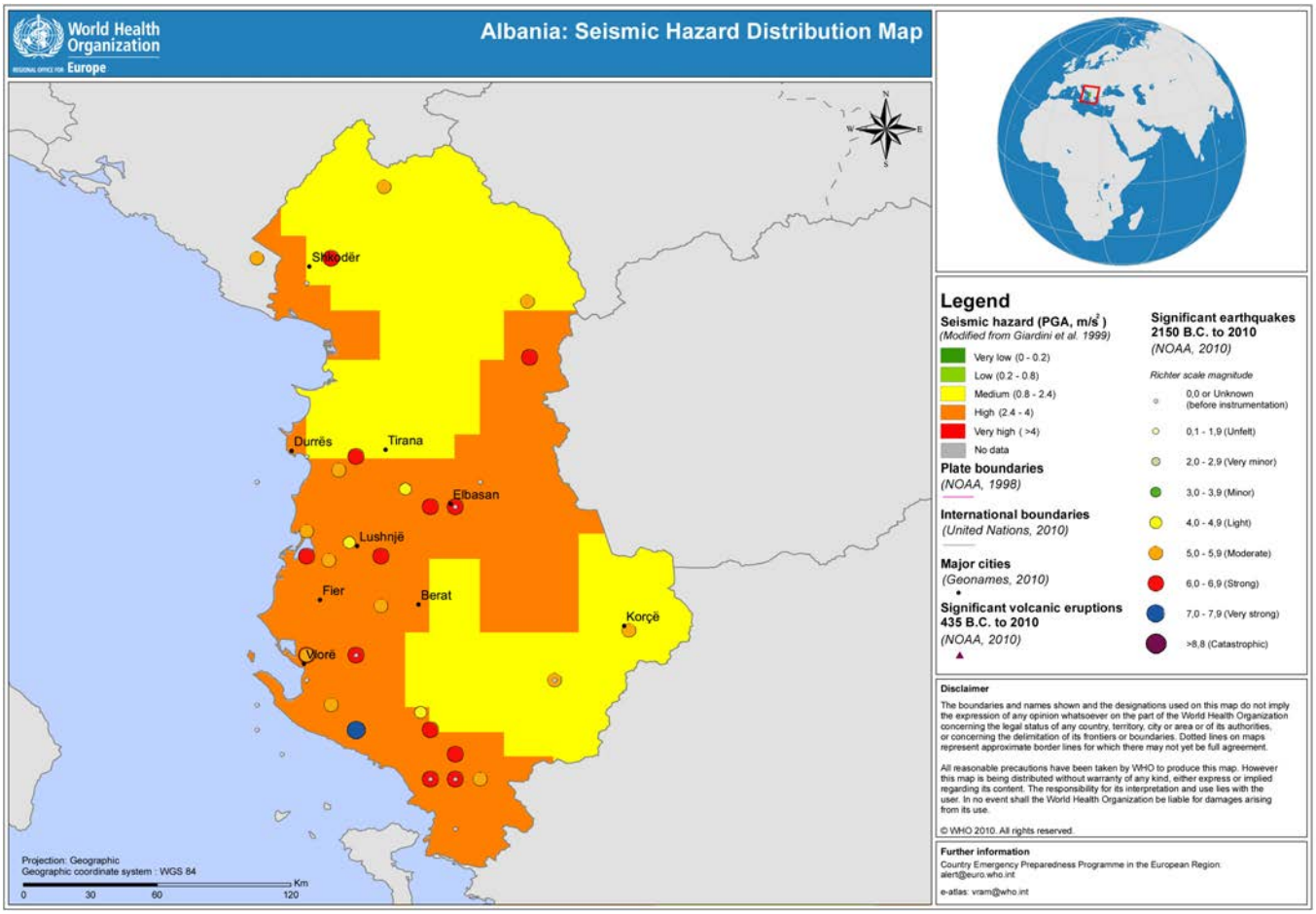

Figure 3: Seismic map of Albania [13]

Richter scale which is dated to January 9, 1988. The earthquake duration did not exceed 6 seconds and the largest acceleration record was a_{max} = 0.4g [11].

The zoning map of earthquake risk in Albania, which is considered to be in the active earthquake zone among the Balkan countries, is shown in Figure 3. The city of Tirana (in the yellow color part) indicates medium risk where the earthquake acceleration is given as 0.8 - 2.4 m / s^2 [14]. In Tirana, an average intensity of 7 is predicted for 100-year earthquake period [11].

2.3. Safety Evaluation of Ethem Bey Mosque: Empirical Approach

In order to evaluate the safety of the building the ratio of the total wall area (for each direction) to the building weight (ΣAdvX, Y / W), the ratio of the total wall area (for each direction) to the building gross floor area ($\Sigma A_{dvX,Y}$ / ,A_b), shear capacity for the EQ load direction ($FR_{dX,Y} = \Sigma A_{dvX,Y} * \tau$) and the length and height slenderness of the walls (Li dv. / ti dv .; and Hi dv. / ti dv.) were examined [12, 13].

Terminology, symbols and abbreviations used in these empirical calculations are listed below:

MSK: Intensity according to Mercalli scale

A_{max}: Max. acceleration

A(T): Spectral acceleration

S(T): Spectrum coefficient

$A_{wX,Y}$: Total area of the walls in EQ direction

ΣAb: Total area of the footprint of the building

W: Building weight

$FR_{dX,Y}$: Shear capacity of the walls at the considered EQ direction

V_t: Equivalent lateral force

$L_{i\ w}$: The length of the walls in one direction

$t_{i\ w}$: The tickness of the walls in one direction

$H_{i\ w}$: The height of the walls in one direction

γ: Material unit weight

R: Structural behavior coefficient

I: Building importance coefficient

T: Building period

In order to define the building weight (W = V* γ), γ material properties of the stone is considered as 24 kN/m^3 [12].

The criteria used for the evaluation decision is given in **Table 1** [12].

Since the building geometry is square and the structural elements are the same in both directions, the structural evaluation calculations have the same values for X and Y directions. Wall calculations are given in **Table 2** and earthquake calculations are given in **Table 3**.

The results of empirical calculations are given below.

The ratio of total wall area to the building weight:

$$\Sigma A_{dvX,Y} / W = 2.27$$

The ratio of total wall area to the footprint area of the building:

$$\Sigma A_{dvX,Y} / \Sigma A_{bina} = 0.20$$

Slenderness of the wall lenghts:

$$L_{dv.} / t_{dv.} = 8.33$$

Slenderness of the wall heights:

$$H_{dv.} / t_{dv.} = 7.63$$

Calculation of equivalent lateral force Vt is made based on building weight, spectral acceleration coefficient and structural behavior coefficient (Vt = W * A (T) / R).

Vt=W*1,4/2

Table 1: Parameters of building evaluation criteria [12]

Criteria	Safety condition
$\Sigma A_w X,Y/W$	≥ 1,2 m²/MN
$\Sigma A_w X,Y / \Sigma A_b$	≥ 0,1
FRdX,Y / Vt	> 1
$L_w. / t_w.$	≤ 18
$H_w. / t_w.$	≤ 9

Table 2: Wall slenderness calculations - X and Y direction

		H	t	L	$L_b=\Sigma l$	$L_{net}=L-L_b$	A_{dv}	V	W	L/t	H/t
	WALL	(m)	(m)	(m)	(m)	(m)	(m²)	(m³)	(kN)		
X & Y Direction	D1, D3	9,16	1,2	10	1,8	8,2	9,84	90,13	2163,23	8,33	7,63
	D2, D4	9,16	1,2	10	1,8	8,2	9,84	90,13	2163,23	8,33	7,63

Table 3: Earthquake resistance evaluation of Ethem Bey Mosque

ΣW	A_b footprint	ΣFR_d		V_t	$\Sigma A_w/W$		$\Sigma A_w/\Sigma A_b$		$\Sigma FR_d/V_t$	
(kN)	(m²)	(kN)		(kN)	(m²/MN)					
		X	Y		X	Y	X	Y	X	Y
8652,90	100	19680,00	19680,00	6057,03	2,27	2,27	0,20	0,20	3,25	3,25

According to the literature research, the value of the structural behavior coefficient representing near to linear behavior is taken as R = 2.0. This value; has been taken in accordance with material behavior according to the values given in both earthquake regulations and literature because of its nature [17]. The value of the A (T) spectral acceleration coefficient is calculated according to the building importance coefficient and acceleration of the earthquake zone where the building is located:

A (T) = A0 * I * S (T)

In order to be used in monumental masonry buildings, the building importance coefficient I was taken as 1.4 and S (T) = 2.5 according to the Turkish Earthquake Code (2007) Table 2.3 [14]. Building importance coefficient is taken as I=1.4 from the Code which is defined for "buildings with the long-term use and where valuable items are stored" [14].

In the empirical calculation, in order to stay in the safe side, soil properties and spectrum coefficient expressing the structural period S(T) is taken into consideration with its maximum value as 2.5 accepted in the Earthquake Code. Apart from the slender and high minaret, the main structure was considered as a rigid and generally short period structure due to the large wall sections [14]. When the results of the empirical calculations were compared with the limit values given in Table 1, it was

determined that Ethem Bey Mosque was structurally safe (Table 4).

Table 4: Evaluation based on empirical calculations of Ethem Bey Mosque

Criteria	Calculation	Safety condition
$\Sigma A_{dvx,y}/W$	2,27 ≥ 1,2 m²/MN	SAFE
$\Sigma A_{dvx,y}/\Sigma A_{bina}$	0,20 ≥ 0,1	SAFE
$FR_{dx,y}/V_t$	3,25 > 1	SAFE
$L_{dv.}/t_{dv.}$	8,33 ≤ 18	SAFE
$H_{dv.}/t_{dv.}$	7,63 ≤ 9	SAFE

3. Conclusion and Final Remarks

The use of advanced analysis methods (such as numerical methods) for historical buildings includes difficulties such as finance, the need of expert specialist, the verification of the results and the method used. In the studies conducted to determine the structural behavior and safety condition of such buildings many criteria must be evaluated simultaneously. The geometry of the structure, the material used, the loads acting on the structure, the transition elements, the relationship between the structural elements and the form of load transfer, repairs and interventions that have been passed over the course of the time should be investigated in detail.

It is important to note that advanced and complex numerical analysis are methods that can be used to understand the behavior and potential damage condition of complex structures and require expert knowledge. On the other hand, simplified methods can be used more widely and can give preliminary ideas in order to decide safety condition of historic buildings.

The main aim of empirical calculations is to understand building weaknesses that may arise from building geometry and material properties. The criteria taken into account in this study are; the ratio between the total wall area and the weight of the building, the ratio between the total wall area and the gross floor area of the building, the capacity of shear walls in the direction of the earthquake load, and the slenderness of length and height of the walls.

It should be remembered that there will always be uncertainties in all studies concerning historical buildings. Although it is based on scientific methods and approaches, it is always considered to be subjective at a certain level as it is done by expertise and experience. Decisions about the structural safety and condition resulting from the calculations and evaluations can only be valid if they coincide with the damage observed in the structure.

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In memoriam of Professor Gennaro Tampone

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More than twenty years have passed since my first meeting with the Professor, at the time professor of "Restauro dell'Architettura" at the University of Florence. The knowledge and love for the wooden carpentry expressed during his lessons and in the discussions with us assistants were disruptive and led me to follow, from then on, my Mentor in the study of timber structures. It could not be otherwise, Professor Tampone (1936-2018), in fact, was able to sublimate the narration on ancient structures, also fascinating the audience less accustomed to the problems of conservation.
He was a "poet" that with perfect synthesis has masterfully intertwined an in-depth scientific and technological knowledge with the humanistic one, reviving an encyclopaedism proper to the founding Fathers of the Restoration, becoming himself a full heir, giving himself, up forever, to the history of conservation.
In his cultural growth, the fundamental contributions of Piero Sanpaolesi - of which he was assistant from 1969 to 1980 - and Guglielmo Giordano - founder of the Italian school of wood science -, both frequently remembered by the Professor with particular affection, made him to develop an eviscerated passion for the ancient timber structures. He has increased such a legacy, translating it into in-depth knowledge so that make him an authority in the field. Furthermore, he added to such knowledge and experience the desire to spread a new sensibility aimed, solely, at conservation. The first conference on wooden structures strongly desired by Professor Tampone, back in 1983, entitled "Legno nel restauro e restauro del legno" ("Timber in restoration and restoration of timber"), is along these lines; such conference was followed by a second edition in 1989. The success was repeated in a subsequent international conference "Conservation of Historic Wooden Structures", held in Florence in 2005, which hardly finds comparisons. These opportunities for debate and meeting brought him definitively to the attention of the world scientific community.
International relations that, however, he had cultivated from the outset, thanks to his consultancy positions for the Diocese of Sinai, for the Maltese government, for the Italian embassy in Turkey and countless others, but above all as an expert member of the scientific committees of ICOMOS, the Iscarsah and, of course, the IIWC.
In 2007, his industriousness in ICOMOS and the acquired authority flowed into the appointment as President of the International Wood Committee, a position that he held for three successive triennia, until 2016. They were years of intense work in which he slowly, through heated symposia, attempted to bring worldwide the culture of knowledge and conservation of load-bearing timber structures. An activity that culminated in the revision of the 1999 Mexico City charter, of which Tampone was one of the authors. A document that follows the

Gennaro Tampone at the Florence ISCARSAH Meeting, 2014 (Photo: M. M. Segarra).

position that he had matured in its long militancy, focused on respect of the configuration, materials and the ancient arrangement, unique elements to be preserved in their entirety, confining the replacement of carpentry parts to exceptional cases only.
Unfortunately, the pressure of some countries in Asia and northern Europe, due to their culture far from Tampone's positions, led to his dismissal as president. It was a considerable loss for Italy, for the whole world, for anyone who shared the culture of conservation with the Professor. He left the scene without clamour, embittered but with the nobility that had always distinguished him, followed by a period of depression, further testimony of his love for ancient structures, which even caused some, although harmless, health problems.
However, he immediately recovered his health stronger and more enthusiastic than ever. In fact, his dissemination activity in the international context continued with the usual fervour, as Italian representative for the "EU COST ACTION FP1101/WG1 Assessment of timber structures", in which he brought his long experience with extreme availability; a participation perhaps solely aimed at accompanying and guiding me once again, an occasion for my "presentation" to the international scientific community.
The development of a new sensitivity towards timber structures was pursued by the Professor with reports at conferences and lectures in several universities and prestigious research centers of the world (e.g. University of Florence, Italian Archaeological School of Athens, ICCROM, American University of Beirut, Columbia University, New York, Barcelona, Valencia, Madrid, Sevilla, Granada, in the Norwegian University of Science and Technology, Trondheim, University of Malta, Universidad de Buenos Aires) as well as through a fervent and always original production of scientific contributions. Among which is the volume published in 1996 by Hoepli, unsurpassed and always current, "Il Restauro delle strutture di legno" ("The Restoration of the structures of timber").
The timber lexicon study was one of the Professor's many insights which he based on the intimate knowledge of the terminology adopted by the first treatise writers in history, in particular Vitruvius and those of the Renaissance period; also a fine linguist therefore, who had, not recently, confided to me that he frequently practiced in translating Latin versions, further attestation of an incredible eclecticism. In this regard, a study was underway for the normalization of terms relating to timber structures, to constitute a vocabulary which, in collaboration with other experts belonging to different nationalities, had to be translated into different European languages.
From its scrupulosity also in the study of the etymology and history of the construction - he called himself an amateur historian (sic!) - the refined distinction between the Italian words "capriata" and the more general in terms of organization of the members "incavallatura" derived.
Professional assignments in his last part of life were more demanding. These works represented almost exclusively research opportunities, never linked to the emolument to be perceived, an attitude that I found fully corresponding to a behaviour held in its daily life, always generous and available, never guided by utilitarian purposes.
Professor Tampone's last professional effort in chronological order was the study and repair of the impressive timber structural system of the cathedral of Paramaribo in Suriname where, after an immediate understanding, with the usual acute genius, of its deformations, instabilities and related causes, he designed and executed what represents a real compendium of the restoration of timber structures, a paradigmatic example of correct conservation.
This is a reversible strengthening system, in perfect harmony with its beloved carpentries, from which the application of some of the principles of undoubted originality theorized by the Professor clearly transpires. Such principles are an important contribution to the debate on conservation and highlight the semiotic value of the failure evidences as essential in order to obtain information on the characteristics of the Monument. Therefore, a peculiar and certainly shareable formulation of the didactic instance: the repairing system has a communicative value in addition to the evidence of failure – the latter need to be conserved if it is possible -, so the intervention has to clearly emphasize the nexus of complementarity between the cause and the implemented strengthening.
Shortly before his passing away he told me, with the usual enthusiasm of the young researcher, about a further consultancy assignment relating to the eighteenth-century carpentry of Giotto's bell tower in Florence, whose heavily deformed beam presented important elements for the advancement in the knowledge of phenomena of visco-elasticity.
The memories that encamp in the mind are many, as it is natural that it is for a particularly decisive and dear figure for me, protagonist in my scientific and human growth: many objectives of mine, important or not, have been achieved thanks to the Professor Tampone's guide, suggestions and stimuli.
The heart is sad, almost tearful but it is sure that, if his friendship will be an unbridgeable loss, his deep hermeneutic sensitivity, the infinite passion for ancient structures and for timber ones in particular, represents an immeasurable heritage for all of us and a teaching for generations to come.

Thank you, dear Maestro, goodbye.

ISCARSAH Meeting

The Tehran Document

22 October 2018

Representatives of the ISCARSAH Committee who reunited in Tehran on 20 to 22 October 2018 express their satisfaction for the results obtained during the discussions in the International Workshop on Restoration and Strengthening of Historical Structures (Tehran Workshop). The Committee would like to thank the Iranian government authorities, specifically the Iranian Cultural Heritage, Handicrafts & Tourism Organization for their warm and friendly hospitality.

Historical monuments and buildings with their unique and sometimes archaic use of building materials, systems and traditional building techniques present distinctive challenges. These challenges vary greatly from the challenges posed by contemporary buildings. Historical buildings can rarely be addressed using standard procedures of evaluation and structural verification that are defined in building codes that have been developed for new construction. Therefore, historical monuments and buildings set their own "standards" and the "standards" are unique to each individual monument or building.

The ISCARSAH committee has been reflecting on this subject since 1997. These reflections are a synthesis of expert thought, experience and wisdom of members from all over the world. The committee has identified similarities and differences relative to building type, building materials, construction techniques, maintenance and the cultural aspects regarding built heritage. The Committee has developed the ISCARSAH Principles and is further developing the ISCARSAH Guidelines to address this challenge. A toolbox has been presented in the meeting for the comprehensive evaluation and potential repair and strengthening of historical monuments and buildings at the Tehran workshop. However, the development of multidisciplinary teams, the use of specific tools, and the decision for intervention will vary from building to building. This variance is caused not only by the materials, systems and building techniques that were used in the original creation and historical modifications to the building, but by the cultural environment, climate, present use, owners and stakeholders, and other factors.

We are aware of new materials and processes which show promise with the strengthening of contemporary buildings as shown by experimentation. We urge heritage conservation engineers to approach these new materials and processes with a healthy skepticism until their long-term efficiency in terms of mechanical behavior, compatibility and durability can be proven by experience in the field. Built cultural heritage should not serve as test cases for these new materials and processes.

All engineers and architects have a responsibility for health, safety and welfare to the public. Heritage conservation professionals also have a responsibility to safeguard the heritage value of the monument. Deep knowledge of the history; art and architecture; and structural, geotechnical, environmental and technological aspects of the monument are essential before implementing any repair or strengthening strategies. With the lack of knowledge, there is always a danger that the heritage value would be detrimentally affected by unnecessary interventions. Performance criteria should always be considered to achieve a correct balance between safety and safeguarding built cultural heritage.

Sustainability has become an important aspect in our era. We know that the most sustainable building is one that is already constructed and that includes all historical buildings. Adapting the use of historical buildings for other uses than those for which they were originally intended can be a strategy for saving cultural heritage. However, the use must be adapted to the monument and not the monument to the use, to avoid detrimental impact on heritage values.

The ISCARSAH committee is pleased and honored to offer its expertise and knowledge to the global community of cultural heritage.