Iscarsah

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

1
newsletter
August, 2012

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

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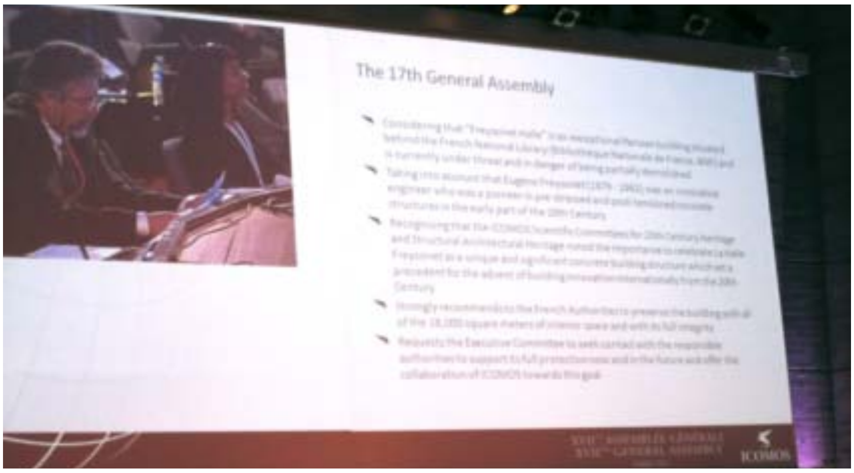

Message of the President of ISCARSAH Stephen Kelley

Dear ISCARSAH Colleagues and Friends,

We would like to welcome you to the first issue of the ISCARSAH Newsletter edited by Vice President Maya Segarra Lagunes! ISCARSAH is a world-wide Committee, and therefore, we do not know each other as much as we would like. This newsletter will provide us with a forum besides meetings and the listserv to share with each other what we are working on. As you can see we have adopted a multi-lingual format for the newsletter. With Google Translate these stories from our colleagues can become an open book for you.

ISCARSAH has grown significantly since 2008 and the committee is a strong presence within ICOMOS. Our last meeting during the General Assembly in Paris had an unprecedented attendance of 38 persons. Such a large committee meeting is difficult to manage efficiently, but we were also afforded the opportunity to strengthen our personal ties. We had representation from five continents. For the first time we held a two hour long webcast thus including members from North America, Europe, and Asia who were not able to journey to Paris.

While in Paris ISCARSAH was fortunate become involved with preservation advocacy surrounding the Halle Freyssinet. Following are excerpts from the Resolution that was put forward during the General Assembly:

Eugène Freyssinet (1879 - 1962) was an innovative engineer who was a pioneer in prestressed and post-tensioned concrete structures in the early part of the 20th Century. ICOMOS scientific committees for 20th Century Heritage and Structural Architectural Heritage note that it is important to celebrate the work of La Halle Freyssinet as a unique and significant concrete building structure that sets a precedent for the advent of building innovation internationally from the 20th Century. La Halle Freyssinet has been named after the engineer, Eugène Freyssinet, and was constructed during the period of 1927-1929 alongside public works projects in Paris such as the Gare d'Austerlitz. La Halle Freyssinet represents 20th Century patrimony that utilizes an early example of pre-stressed concrete for construction of architectural enclosure with grand volumes totaling 18,000 square meters. The interior spaces are unique, timelessly elegant and magnificent. As International heritage experts meet during the Assembly meeting at UNESCO, it is strongly recommended that the building and all of the 18,000 square meters of interior space be preserved in its full integrity and that action be taken to ensure its full protection now and in the future. At the time of this writing, this initiative has gained the attention of the Parisian municipality and plans to alter or demolish the Halle Freyssinet have been stopped.

We are headed in a dynamic direction in the next few years. Our initiatives include meetings and study tours, symposia, and the writing of a technical publication on conservation engineering. Through these initiatives and through future newsletters I hope to personally get to know each and every one of you.

Sincerely,
Stephen J. Kelley
President - ISCARSAH

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Newsletter n. 1
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Franciscan Missions of San Antonio, Texas

Patrick Sparks
Sparks Engineering, Inc.

Work continues on monitoring, diagnosis and stabilization of three of the five Franciscan Missions of San Antonio, Texas, which were recently nominated the UNESCO World Heritage List.

Working with conservators at the Mission San Antonio de Valero (1724), most commonly known as the site of the battle of the Alamo (1836), a first phase mortar survey has been completed, and plans are being made to extend this to a full materials-conservation database, along with other diagnostic surveys. A major structural stabilization has been completed at Mission San Juan de Capistrano (1731), after several years of study and monitoring of expansive soil movement. A nearby photo shows the large arching crack that was caused by the movement. Structural monitoring continues at Mission San Francisco de la Espada (1741). Espada and San Juan remain active Catholic churches.

The gates of Trinity College, Cambridge

David Yeomans

A pair of gates might seem an unlikely subject for structural restoration but these date from the sixteenth century and each leaf weighs 3/4 tonne. Apart from any intrinsic historical significance they may have in their own right, the gates of Trinity College in Cambridge, form the entrance to an important group of historic buildings. They had suffered the ravages of time and there had been major repairs in the nineteenth century, but recently it became clear that new repair work was needed when the gates began to drag on the ground. This was because they had dropped and, apart from the forces required to overcome friction at the ground, the gates came into contact at the top before they were completely closed. As the college porters applied forces to close the gates there was some out of plane bending which resulted in fracture of one of the meeting stiles. Apart from that the need to deal with the problem became urgent when the top hinge on the north gate broke, so that the gate was now hanging on only two hinges rather than the original three.

The gates required more than the structural repairs because they were covered with linen-fold decoration, which also needed repair (Fig 1). The major timbers were held together with large iron rivets, which an x-ray survey showed to be in good condition. These would have to be drilled out if they had to be removed so that it was desirable to limit the extent to which the gates had to be dismantled. This ruled out the first proposal for dealing with the structure of the gate. An engineer engaged by the college had suggested using steel straps between the top hinges and the toe of each gate and a specialist contractor was asked to tender for the repair work on that basis. However he pointed out that such straps would need to pass behind major timbers requiring the almost complete dismantling of the gates and proposed an alternative solution, which was to fasten a steel bracket to the hanging stiles to pick up the weight of each gate.

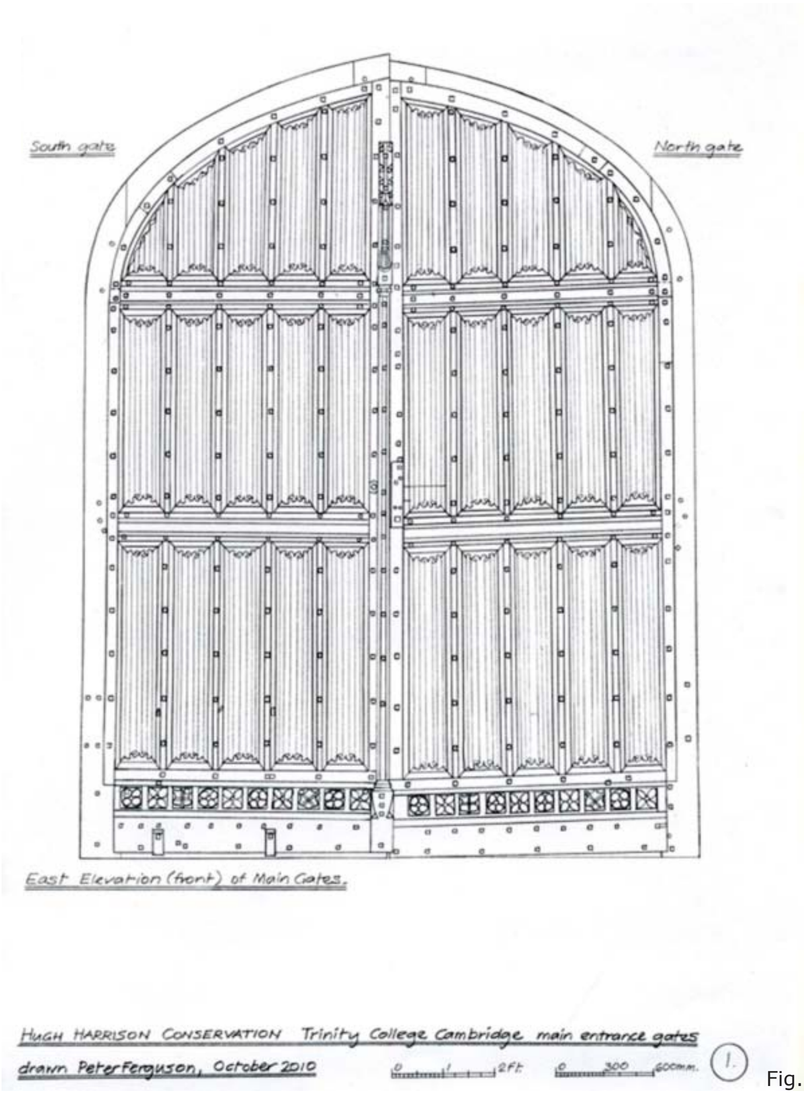

Fig. 1

Fig. 2

A 'back of envelope' check suggested that it would be a feasible solution though I only had a couple of photographs to look at. At that time the gates were still in position so that no detailed examination of the timbers had been possible. Nevertheless we were instructed to proceed on that basis. Detailed examination of the gates had to wait until the first of them had been taken down and carried to the workshop.


Fig. 3

It was only then that the condition of the gates that must have necessitated the nineteenth century repairs and the extent of the changes then made could be appreciated. Clearly both the bottom rail and the hanging stile of both gates had rotted and had been cut off. Examination of the growth rings on the remaining part of the rail on the south gate showed that approximately half of the rail had been cut away. The new timbers added below the remaining timbers of the bottom rails were held in place by wrought iron straps. The replacement timbers for the bottom of the hanging stiles had been lap jointed onto the original timbers which had been cut back to receive the new pieces. These surfaces offered a means of fixing to the gate without any additional cutting of original timber even though they were clearly not ideal. Figure 2 shows the bottom corner of the north gate and Figure 3 that of the south gate.

Rather than immediately adopting the proposed scheme my first question was to consider how the structure of these gates had been working for four hundred years. The ideal would have been to restore something like the original mode of behaviour if at all possible although the support forces provided by the hinges had clearly changed. The gates were each hung on three hinges, so how the support forces were distributed originally can only be a matter of speculation. As the bottom rails had been cut back and new pieces fastened on, this required some refixing of the bottom hinge so that it seems likely that there was a period when the gates were hanging on the top and middle hinges. More recently the hinge pintle of the north gate had broken so that was now hanging on the middle and bottom hinges. Concern was that misalignment of the hinges had been producing out of plane bending in the gates and it was resolved to hang them on the top hinges and pins below the gates.

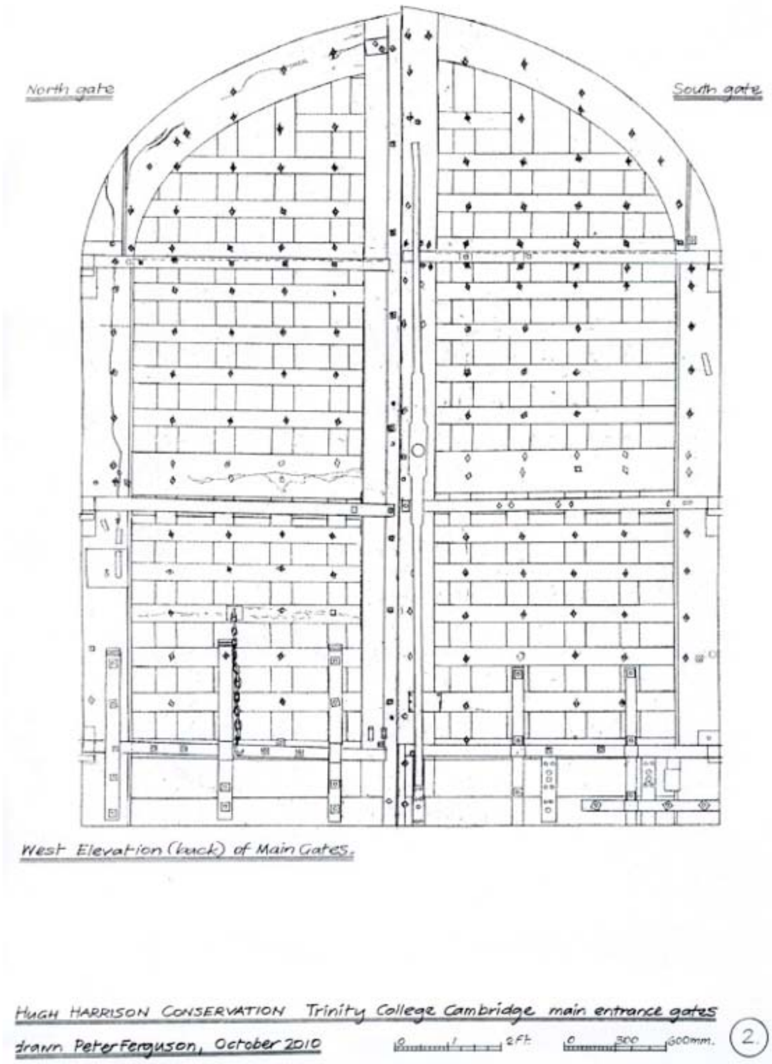

Fig. 4

The body of the gate comprised ledges and muntins with half lap joints and vertical boards between the muntins (Fig. 4). Examination of the joints between these framing timbers suggested that the gates had been working by diaphragm action provided by the resistance to rotation of the joints between the muntins and ledges. The vertical boards may have originally contributed to this but their shrinkage now made them ineffective. The options seemed to be to design steel brackets as originally intended or to demonstrate the possibility of relying upon diaphragm action. The latter held open the possibility of the least intrusive repair strategy and was seriously considered. It would have been necessary to demonstrate that forces within the diaphragm were within acceptable limits and that the method of load transmission was sufficiently robust to cope with changing moisture content within the timber. However, there were practical difficulties that were to prevent the full exploration of this mode of action. The fixing of the lower pivot required some steelwork to be attached to the gate. It was also pointed out that both college and conservation authorities were anticipating the steel bracket to be used, so that a change of repair strategy would have caused delays.


Fig. 5

Design of the steel bracket for each gate was simple. It was a T shaped plate to carry the weight of the gate with a socket at the end into which the bottom hinge pin could be screwed. This hinge pin was to go into a box set in the ground where the receiving socket could be adjusted for position. The position of the plate was dictated by the position of the surface on the hanging stile to which it had to be attached. The basic plan was to use this surface to attach the short leg of the L shaped steel. so that it could then be concealed by the original repair timber. Figure 5 shows the steel in position on the north gate. The design problem was to arrange sufficient fixings to carry transfer the moment from the steel plates into each stile taking account of the condition of the timber. The plate also had to be wrapped round the back face of the stile to stiffen it against the bending moments produced by the eccentricity of the hinge pin.

The area for fixing was very small in both cases and the condition of the timber variable. In both cases there were holes where there had been bolts holding the repair timber in place and there were also mortice pockets in the timber of the north gate. However it was possible to find sufficient room to use screws acting in shear to fix the plate without additional cutting of the timber. On the south gate there were no mortices visible in the surface available, and drilling showed there were none under it, but the area available for fixings was much smaller. Initially the holes made for the wrought iron bolts in the nineteenth century repair seemed to offer a simple solution; we would simply replace wrought iron with steel of a suitable diameter. However, there was a split round one of the holes, which not only prevented its use for carrying load but necessitated a completely different method of load transfer. It was necessary to shape the plate so that screws in withdrawal could be used at that end. The lever arm between the two forces was so reduced by this that a pair of bolts in the original holes at the other end would have been insufficient. In that case it was necessary to cut a slot in the stile to take the plate up above the nineteenth century reduction in the section in order to obtain a sufficient lever arm between fixings.

Design of the fixings was carried out within the constraints on spacing, end and edge distances specified in current design codes. It should also be noted that the design was also dependent upon having confidence in the high level of skill available in the workshop. Stainless steel was used for plate and screws. At the time of writing the north gate has been repaired and hung in position while work on the other is being completed in the workshop. It should be in position by the time you read this.

The endless column

Ramiro A. Sofronie
Emeritus Professor, Bucharest, Romania - Chair holder of UNESCO Chair #177

Fig. 1

The Column has been erected 75 years ago in only three months, between 15 August and 15 November 1937, in Targu Jiu, Romania, by the sculptor Constantin Brancusi (1876-1957). It is the only endless column in the World and belongs to the Memorial devoted to the heroes of the First World War 1914-1918 (Fig. 1).

The Column together with the Table of the Silence, the Alignment of Stools and the Gate of the Kiss form an architectural and urban ensemble extended along a distance of 4 kilometers and called by sculptor the Alley of the Souls. In this Memorial an existing orthodox church, which proves the east-west orientation of the ensemble, was also included

Each group of sculptures has been endowed with a precise function. For instance, the massive Gate, like a small triumphal arch, does not refer to the ordinary, real kiss by lips. The image carved in travertine is suggesting the fascinating idea of the kiss by perfect superposing of the two involved faces, according to the vertical line of gravity, the eyes also including. At its turn the Endless Column, as a funeral monument, was supposed to create a link between Earth and Heaven. It means a virtual link devoted to the transcendence of heroes souls, detached from their material bodies. This is why the feature of the Column of being endless or even infinite was tacitly accepted from the very beginning not only as a natural condition, but also as a necessary one. When the erection was completed under his careful supervision, Brancusi asked to his team to paint the Column in the yellow colour of wheat fields in ripe. In the same time he stated to his countrymen: *You are not able yet to realize what I have left to you!* Then quietly he left for ever to Paris. During those twenty years that followed, from 1937 to 1957 when he passed in eternity, he did not produce any new piece of art. The Endless Column was his last masterpiece.

The late architect Silvia Paun ascribed a megalithic stylization to that architectonic ensemble of modern art. She identified the Table of the Silence and its twelve Stools with a *Cromlech* or a Circular Temple of *Menhirs*, the Alignment of Stools with a Linear Temple of *Menhirs* horizontally extended, the Gate of the Kiss with a *Dolmen*, and the Endless Column with a Linear Temple of *Menhirs* vertically extended. Once these functions recognized as such, the Ensemble of Targu Jiu was integrated with other vestiges of World Megalithic Cultures like Carnac in France, Stonehenge in Great Britain and Sarmisegetuza in Romania. It was for the first time in History when the Modern Sculpture at such large scale reflected so faithfully the ancient art expressed by stone not only in shape, but mainly in the meaning of their messages. In fact, most of Brancusi sculptures have been shaped in natural stone (Fig. 2).

In his ambition of genius to reach the Heaven Brancusi was aware what happened on the Babel Tower (*Genesis* 11, 1-9). He understood what philosopher Mircea Eliade already wrote that only the human soul is able of transcendence i.e. passing from material space to the spiritual one. Brancusi assumed from

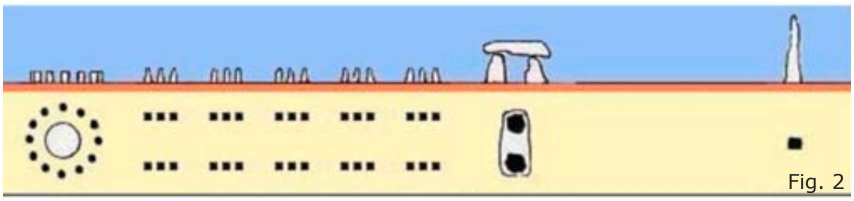

Fig. 2

his *birds* that the main obstacle in reaching the Heaven might be **gravity**. That discovery also disclosed the failure of biblical attempt on Babel Tower. Gravity contents of matter were well known from long time. Aristotle (384-322 BC) believed that gravity was one of the two forces of universe, but only two thousand years later, in 1687 Newton, in Book III of his *Principia Mathematica*, published the universal law of gravity.
This law perfectly suits to the approach of Brancusi about the symbolic flight of his birds. Mircea Eliade wrote that by those statues Brancusi expressed the essence of the flight by *coincidentia oppositorum*. Unfortunately for Brancusi, Newton's law does not apply to human souls. Gravity remains limited to human bodies, while for the immaterial souls he was obliged to find another law available to human beings. Obviously, something essentially free of gravity and different by imponderability. This is why, by an intuition of genius, Brancusi decided to use that what today is currently called Topology or *analysis situs*, an advanced science of shaping. Since the year 2001, when the UNESCO Congress was held in Paris, two topological concepts were identified in the act of creation of the Endless Column. Later a third one was added, and the door of knowledge remains opened for other discoveries.
First concept is anthropomorphism and refers to the stylization of humans. Traditionally, memorials like those for Trajan in Rome, Napoleon in Paris, and Nelson in London were built as massive stone columns, all higher than 30 m and each supports on its top a statue. Brancusi never imitated other creations. For the funerary monument in Targu Jiu his option was a slender column in a modular composition of less than 30 m in height. Along a steel core a score of identical modules of cast iron were successively laid one over the other in the vertical direction of gravity. According to their statute of representing young heroes, the modules were shaped like stylized coffins. Each module is represented by an isosceles decahedron with four vertical plans of symmetry and a horizontal one at the middle. That decahedron satisfies the topological theorem of Euler between facets, peaks and edges F + P = E + 2, namely 10 + 12 = 5 x 4 + 2. The height of each module is 180 cm; the middle square is 90 x 90 while the two end squares are 45 x 45, following the proportion 4:2:1.
Due to the existing horizontal plan of symmetry each decahedral module can be regarded as composed by two identical hexahedral units. They were used by Brancusi in composing the Column by 15 full modules and 2 halves located at the two ends what is equivalent with 16 modules. By adding at Column base a short guard length its total effective height is h = 29.35 m. Therefore anthropomorphically, the Memorial Column consists in a succession of standing identical coffins accordingly stylized.
The second concept is an idiomorphic one being related to the perfection of shaping. In the theory of aesthetics the unit for measuring the perfection of monuments and evaluating thus the beauty of human creations is the golden mean or triangle, also called the sacred proportion, φ= 1.618. It was used, for instance, to the Cathedral Notre Dame of Chartres in France (1134-1220), but also to the Petrindu Church in Romania (1612). In the case of decahedral module created by Brancusi on each of its facet four golden triangles were identified. That means only a single module contains 4 x 8 = 32 golden triangles, while the whole Column is based on 8 x 8 x 8 = 512 golden triangles. That remarkable figure explains why Brancusi asked for painting his Column in a golden yellow color. By comparison, Cheops Pyramid in Giza, Egypt (2601-2515 B. C.), which geometrically is a pentahedron, also satisfying Euler's theorem 5 + 5 = 8 + 2, contains only four golden triangles, located two by two in the vertical plans of symmetry, perpendicular on base sides. A surprise comes from Mesopotamia.
The reconstituted dimensions of the former Babel Tower, erected as a ziggurat probably by the King Hammurabi the Great (1792-1750 B. C.) are 90 x 90 x 90 meters and they coincide, at the scale of 1:100, with Column's hexahedron of 90 x 90 x 90 centimeters. That means that the Babel Tower contained 4 x 4 = 16 golden triangles what explains its worldwide and long lasting fame. As far as the Column height is concerned it was not at all randomly chosen. It is easy to observe that 16 modules mean 10 φ with an error of only 1,125 %, what proves the golden choice of Column height. But what is really amazing is the height h = 29,35 m adopted by Brancusi for his Column in Targu Jiu differs with less than 1 % by the diameters d = 29,426 m of the two megalithic circular sanctuaries in Stonehenge, UK and Sarmisegetuza, Romania. Therefore the idiomorphic concept of shaping is fulfilled.
The third concept is auto or isomorphism and explains the unique quality of being endless. In composing his Column out of decahedral modules Brancusi has used the topological law of self-generating the forms based on congruence or the well knowing mirroring effect. Indeed, after repeating several times the congruence of modules, the topological law of isomorphism came in force consecrating the endless feature of the Column. In fact,

mirroring effect caught the attention of thinkers long ago. For instance, in Egyptian Mythology the beginning of time *Zep Tepi* was marked in the year 11,451 BC. when the Milky Way and the Nile have perfectly mirrored each other. Later Plato (429-347 BC), in his book *Republica*, recommended to all artists to use, in doing their creations, looking glasses. Much stronger influence of this effect on humans came from the Myth of Narcissus. According to Greek Mythology, *Narcissus saw his own reflection in the water and fell in love with it. Unable to leave the beauty of his reflection, Narcissus died*. A classic version of this legend was included by Ovid in his *Metamorphoses*, and in modern times, Oscar Wilde wrote *The Picture of Dorian Grey*. Although Brancusi never confessed, it seems he was the only human being in the World who clearly understood that the beauty seen by Narcissus in the pool comes from the lack of gravity. Any human body liberated by the confinement of gravity feels displaying a brighter mirrored image than the original one. It looks like the mirror bears the key of immortality. Thus Brancusi discovered exactly what he arduously needed for reaching the target of his Memorial: keeping symbolically the bodies in coffins and allow the souls to leave the material space along the visible unlimited way, opened by repeated congruence of modules. Brancusi expressed his art by *Geometry*, but he consequently created through *Topology*. Therefore the concept of auto or isomorphism has a strong support in history and it definitely proves that topologically the Column is really endless.
In the year 1996 the distinguished professors Giorgio Croci and Stephen Kelley, as experts of UNESCO and World Monuments Fund, have inspected the Memorial in Targu Jiu and supported the restoration program for the Endless Column. The work has been successfully completed, and now the site is opened for public. The whole ensemble is a wonder worth to be seen by anyone interested in the mysteries of life.

News from Finland

Kari Avellan
KAREG Consulting Engineers

Personal projects of KAREG Consulting Engineers

The shipyard of Sveaborg (Suomenlinna)
The shipyard is built partly on Swedish time and partly on Russian time, when Finland was a Grand Duchy of Russia. After the independence of Finland (1917-12-6), just before the World War II the shipyard was deepened by blasting and lots of concrete work done. KAREG is in charge of the quay wall next to the floating door of the lock (Fig. 1, Fig. 2).


Fig. 1


Fig. 2

Ice Hockey World Championship 2012
The expansion of Hartwall Arena in Helsinki was built, because Ice Hockey World Championship was played in Helsinki and Stockholm. KAREG was in charge of the project as technical consulting engineer and especially as resident engineer for rock strengthening, foundations and concrete structures. The thickness of rock wall between the Arena and the rock restaurant was partly only 1.69 m and the buckling height about 5.0...5.5 m. The arch has of course a horizontal load (Fig. 3).

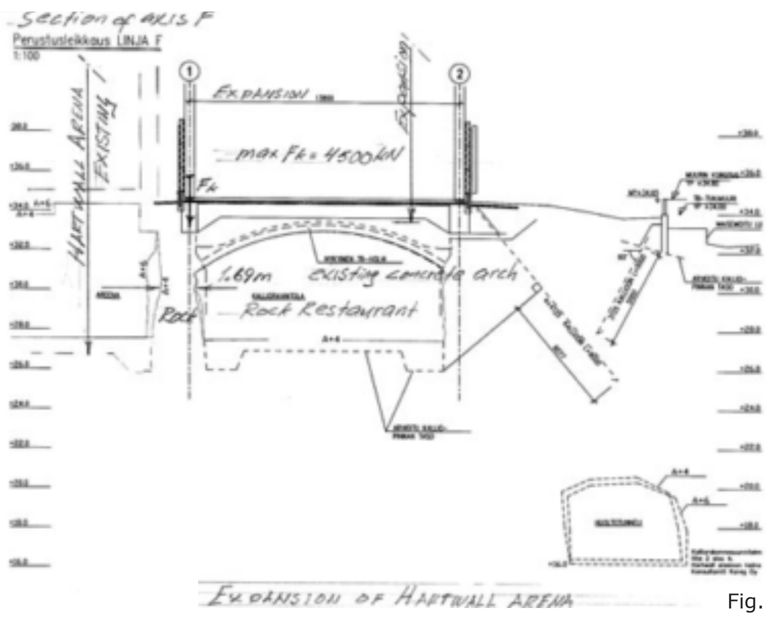

Fig. 3

ISCARSAH Meeting: Havana, Cuba 2011

Workshop: Earthquakes and Hurricanes

Response and Preparedness

May16-17, 2011; College of San Geronimo, Havana, Cuba

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Workshop: Earthquakes and Hurricanes Response and Preparedness

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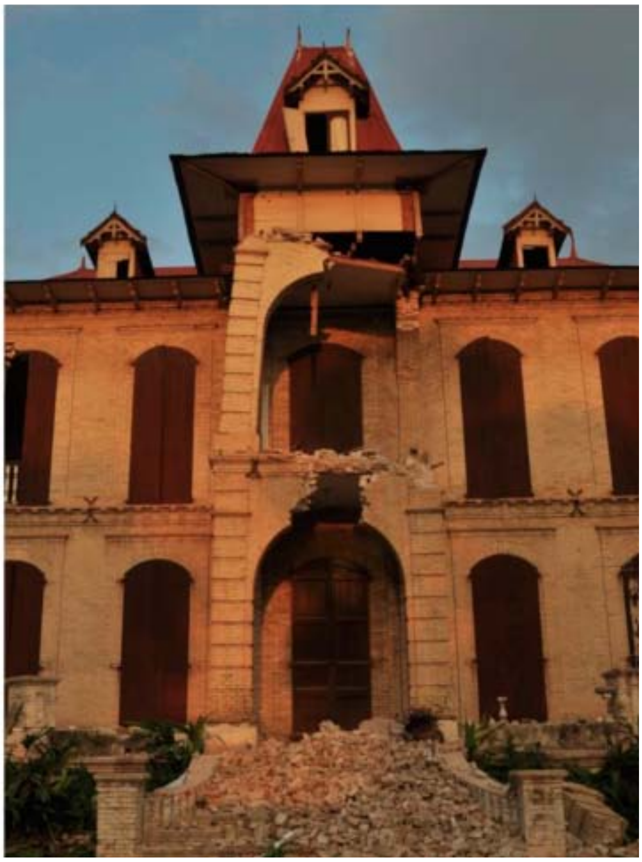


Program

16 May 2011

9,00 Opening Ceremony with Cuban Authorities

10,30 I Session: Tradition and Identity vs Risks

Survivability and Cultural Identity - William A. Dupont
Trinidad and its preparedness facing natural disasters - Yamilka Alvarez Martínez
Risk map of the declared World Cultural Heritage zone of the City of Camagüey - Ernesto Guzmán Lastre
In praise of tradition, or how history is the source of endless technical knowledge (and wisdom) -Maria Margarita Segarra Lagunes
Bioclimate and Demolitions. Techno-constructive state in the intervened urban contexts - Mario Garbayo Otaño

15,00 II Session Seismic Risk

Outlines of the damage to heritage structures by the Great East Japan Earthquake of March 11, 2011 - Toshikazu Hanazato
The 2009 Haiti Earthquake and aftermath- Randolph Langenbach
The 2011 Christchurch earthquake - Win Clark, Stephen Kelley
Geogrids as Seismic Reinforcement for Earthen Buildings - Daniel Torrealva
Pre-Hazard Risk Assessment of Monumental Historic Structures - Meltem Vatan, Görün Arun
Matanzas Bridges, a valuable testimony to be taken into account in the comprehensive heritage management - Ramón F. Recondo Pérez, Luis R. González Arestuche
The Study on Earthquake-Resistant Properties and Anti-seismic Strengthen Plan of Yingxian Timber Pagoda - Wang Lin an, Hou Weidong
Seismic performance of and a unique energy dissipation approach for existing concentrically braced steel frame structures - Thomas Morrison
Geogrids as Seismic Reinforcement for Earthen Buildings - Daniel Torrealva

17 May 2011

9,00 III Session Typhoon and Hurricane Risk

Typhoon and Earthquake Monitoring of Timber Heritage Structure – Case Study of Five-storied Pagoda in Japan - Toshikazu Hanazato, Chikahiro Minowa, Yasushi Niitsu, Kazuhiko Nitto
Improving Hurricane Survivability of Heritage Structures - Patrick Sparks
Mitigation of flood damage to cultural heritage - Milos Drdacky
Experiences in the protection of closing systems under the effect of extreme wind loads - Obdulio Coca Rodríguez, Jorge Arcos Méndez, Emilia Fors Garzón.

15,00 IV. Risk Reduction and Management of Risk

Structural Assessment for the Seismic Retrofitting of Earthen Historic Buildings after the 2007 Earthquake in Peru - Claudia Cancino, Sara Lardinois
Modeling and simulation as basic requirements of structural vulnerability in disaster study cases - Angel Martínez González
Geographical application to natural processes, menaces and risks in disaster study cases - Silvestre Elier Pacheco Moreno
Rethinking Resilience: Pacific Island Perspectives on Natural Hazard Risk Reduction - Karl Kim, Dean Sakamoto
Analysis of cost-profit in risk and vulnerability. Study case: Reloj Club bonded warehouse - David Nuño Gradaille
Implementation of safe hospitals strategy facing natural disasters - Carlos Llanes Burón, María Luisa Rivada Vázquez
UK Methodology for Cultural Heritage Disaster Response - Sue Cole, ICORP Vice President

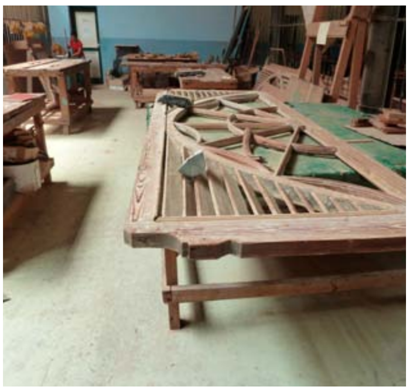
The ***International Scientific Committee on the Analysis and Restoration of Structures of Architectural Heritage (ISCARSAH)*** was founded by the Paris-based International Council on Monuments and Sites (ICOMOS) in 1996 as a forum and network for engineers involved in the restoration and care of the World's built heritage. Members of the ISCARSAH are internationally renowned engineers, architects, scientists, specialists, and educators with representation from Europe, Asia, Australia, North and South America. ISCARSAH has authored the ***ICOMOS Charter - Principles for the Analysis, Conservation and Structural Restoration of Architectural Heritage*** which was ratified in 2003.

Miembros del ISCARSAH de visita al Castillo de la Real Fuerza en La Habana.

Visita a la Escuela Taller "Gaspar Melchor de Jovellanos" en La Habana

Orestes M. del Castillo del Prado
ICOMOS Cuba

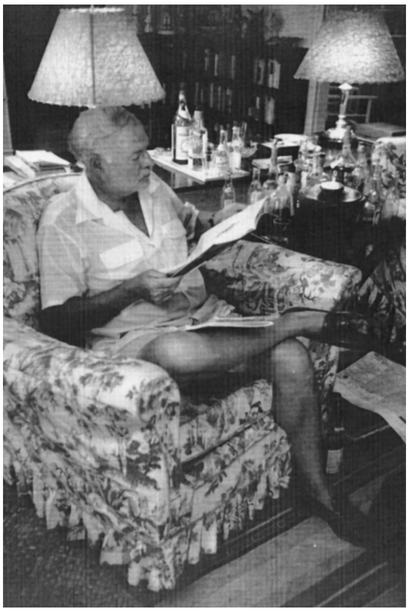
Una vez concluidas las Sesiones de Trabajo del Taller Internacional "Terremotos y Huracanes. Respuesta y Preparación" organizado por ISCARSAH, llevado a cabo por primera vez en La Habana, Cuba, el Comité Organizador Cubano coordinó una serie de visitas a instituciones y lugares de interés relacionados con los objetivos de la conservación del patrimonio construido, su respuesta y preparación ante fenómenos naturales.
Una de esas visitas se realizó el 19 de mayo 2011 a una de las sedes de la Escuela Taller "Gaspar Melchor de Jovellanos", de la Oficina del Historiador de la Ciudad de La Habana, en la que se preparan jóvenes en los diferentes oficios de la construcción con énfasis en la recuperación de métodos y procedimientos tradicionales de ejecución de obras, principalmente en el campo de la conservación histórica.
En la Escuela, los visitantes acompañados por miembros de ICOMOS Cuba fueron recibidos por personal de la Dirección de la Escuela, quienes explicaron los contenidos de la enseñanza que se imparte y la forma teórico-práctica en que se desarrolla, dando desde los primeros momentos del inicio de sus estudios una participación directa de los estudiantes en las obras de recuperación del patrimonio edificado en el Centro Histórico de La Habana Vieja, un entorno urbano que permite apreciar el carácter de la arquitectura colonial y los esfuerzos que se realizan para preservar monumentos que datan de varios siglos de existencia.
Los distinguidos miembros de ISCARSAH que participaron en la visita pudieron apreciar, desde muy cerca, cómo los jóvenes estudiantes se preparan en el trabajo del taller, con el soporte de materias teóricas que le dan el conocimiento y dominio del oficio elegido que, al final de un período escolar de tres años, les permite alcanzar el certificado de obrero calificado y les garantiza empleo en las entidades que tienen a su cargo la rehabilitación del Centro Histórico de La Habana Vieja.



A visit to Ernest Hemingway's Home

William A. Dupont, AIA
Director, Center for Cultural Sustainability at UTSA College of Architecture

During our ISCARSAH meeting in Havana, Cuba, in the spring 2011, a small group of members made the trip out to Ernest Hemingway's home one afternoon. Hemingway called it Finca Vigía, meaning farm with a view, and he lived there from 1939 to 1960, during which time he wrote *For Whom the Bell Tolls*, *The Old Man and the Sea*, *A Moveable Feast*, and *Islands in the Stream*. The house and grounds became Museo Hemingway in 1963. I led the group due to my friendship with the museum's Director, Ada Rosa Alfonso Rosales, and her staff.



In the spring of 2005 Hemingway's Finca Vigia was nominated to the "11 Most Endangered List" of the U. S. National Trust for Historic Preservation. This led to a long-standing and fruitful partnership between the Finca Vigía Foundation in Massachusetts (dedicated to conservation of Hemingway's home and the documents contained there), the National Trust, and the Cuban government agency responsible for management of museum properties, the Consejo Nacional de Patrimonio Cultural (CNPC). A team of US professionals began visits in fall 2005. When the collaboration began, I had then served 9 years as the architect for the National Trust's historic sites. I became the leader of this "technical team" and developed great friendships over more than a dozen visits that followed.

So, when ISCARSAH members expressed interest in a visit, it was a simple matter to contact the museum and make arrangements for a visit.

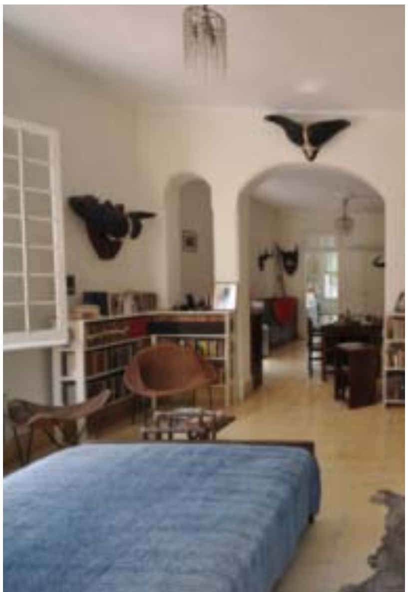
The museum Director, Ada Rosa, met our ISACARSAH group with open arms and engaged us in a conversation on museum management issues. She was pleased to show us the museum's recent acquisition of Hemingway's 1957 Chrysler convertible. She uncovered the relic, lacking an engine yet largely intact, for a few quick photos. Later our group took a stroll past Hemingway's deep sea fishing yacht, Pilar, now in permanent dry-dock on the site and we enjoyed the beauty of the landscape Hemingway inhabited. The swimming pool with its twin cabana structures was a highlight, as was the shaded patio with a commanding view across fertile valleys to distant Havana 10 miles north on the coast. Ernest Hemingway was 39 years old when he rented Finca Vigía with his 3rd of four wives, an old farm estate that he soon purchased to be his home. Twenty-one years later he left Cuba in the summer of 1960 on one of his many trips abroad, intending to return. What remains in Cuba are the home and landscape he inhabited plus all the tangible elements of his life – first edition books, letters, record player, hunting jackets, fishing rods, liquor bottles, his black Royal typewriter and stacks of magazines by the side of his bed – all arranged as they were when he shut the door in 1960. The house sits now as a time capsule of Hemingway's life, essentially unchanged since the day he departed for a trip to Spain from which he never returned.

The US Technical Team continues to assist our Cuban colleagues in an advisory capacity under a special license from the United States Treasury Department.

The authorization to travel to Cuba, work with Cuban museum professionals, architects, engineers, and conservators on the site, and to engage in documentation and assessment of the preservation needs of Finca Vigía is an extraordinary thing due to the lack of diplomatic relations between the two neighboring countries.

Cuban and American professionals in the field of heritage conservation have never had specific interaction in Cuba. The Technical Team is the only group of American design professionals sanctioned to work in Cuba since the 1959 Revolution.

The care of museum properties is a continuous effort. Much has been accomplished since that first visit in 2005, and an array of future projects await the joint team of professionals working to preserve Hemingway's legacy in Cuba.



Visita a las Escuelas Nacionales de Arte

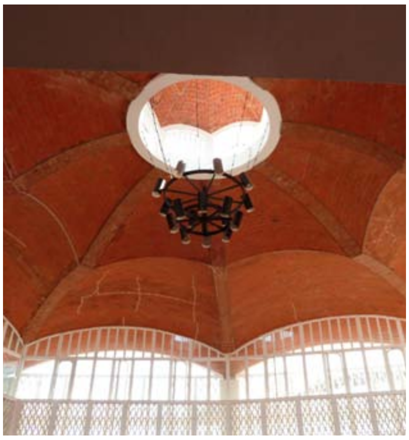
Orestes M. del Castillo del Prado
ICOMOS Cuba

El conjunto que constituyen las Escuelas Nacionales de Arte, es un icono de la arquitectura del movimiento moderno en Cuba y ha despertado desde sus etapas iniciales un gran interés por muchos y diversos aspectos, tanto formales como funcionales y sobre todo por la integración de los edificios en el medio en que han sido construidos y también porque cada uno de ellos encierra un concepto significativo de organización del espacio con profundo sentido urbanístico.

En la continuidad del programa de visitas preparado para los participantes del Taller Internacional "Terremotos y Huracanes. Respuesta y Preparación", un grupo de ellos realizó un largo e intenso recorrido por el lugar el día 19 de mayo, tras concluir las Sesiones de Trabajo que tuvieron lugar para exponer y discutir un número importante de ponencias científicas presentadas, tanto por los miembros de ISCARSAH que concurrieron al Taller como por los profesionales cubanos que expusieron sus propias experiencias en la respuesta y preparación ante los huracanes y terremotos que, con cierta periodicidad, afectan al país.

Los visitantes recorrieron la totalidad del conjunto pudiendo apreciar las rehabilitaciones hechas a las Escuelas de Artes Plásticas y Danza, así como la inconclusa Escuela de Artes Escénicas, y las Escuelas de Música y Ballet, estas últimas en estado ruinoso y pendientes de que se acometan las necesarias intervenciones constructivas para rescatar y poner en funcionamiento esos inmuebles.

En términos generales el grupo que visitó la obra pudo conocer "in situ" todas sus características constructivas que siguen la pauta de la ejecución de bóvedas tabicadas, una técnica heredada de maestros catalanes, que fue introducida en Cuba por ellos, desde hace más de un siglo.



Visita al Estado Mayor del Consejo Nacional de la Defensa Civil y al Instituto Nacional de Meteorología

Orestes M. del Castillo del Prado
ICOMOS Cuba

Como parte importante de las actividades del taller Internacional "Terremotos y Huracanes. Respuesta y Preparación" los participantes hicieron una visita al Estado Mayor del Consejo Nacional de la Defensa Civil. Allí el Jefe del Estado Mayor les dio una amplia explicación sobre el funcionamiento del Consejo Nacional de la Defensa Civil y las acciones que se llevan a cabo en la prevención de afectaciones a la población en caso de desastres naturales, la preparación general ante esas situaciones y la respuesta que se da para resolver los problemas que esos eventos ocasionan.

Como complemento, tres especialistas de esa institución ofrecieron conferencias relacionadas con el trabajo que da lugar a la atención a la población en esos casos y las medidas que se aplican para minimizar y hasta evitar afectaciones de carácter grave, una de las conferencistas participó en las Sesiones del Taller. A continuación los participantes visitaron el Puesto de Mando y allí recibieron información detallada del trabajo que se realiza, en forma permanente, en todo el país para preparar a la población y disminuir riesgos y pérdidas, estableciendo un sistema de información dirigido a ese propósito.

Una vez finalizada la visita a la Defensa Civil, los participantes se dirigieron al vecino Instituto Nacional de Meteorología, donde el Director del Departamento de Pronósticos explicó el detallado sistema de información que se ofrece como prevención de situaciones graves en caso de huracanes, desde el momento en que estos comienzan a formarse, su trayectoria y características principales, su paso a través del país por medio de partes que se transmiten por todos los medios de comunicación nacionales.

El Director ofreció una conferencia sobre los huracanes en Cuba que se completó con un amplio debate sobre el tema en el que los visitantes participaron activamente.

Réunion du Comité ISCARSAH à Paris

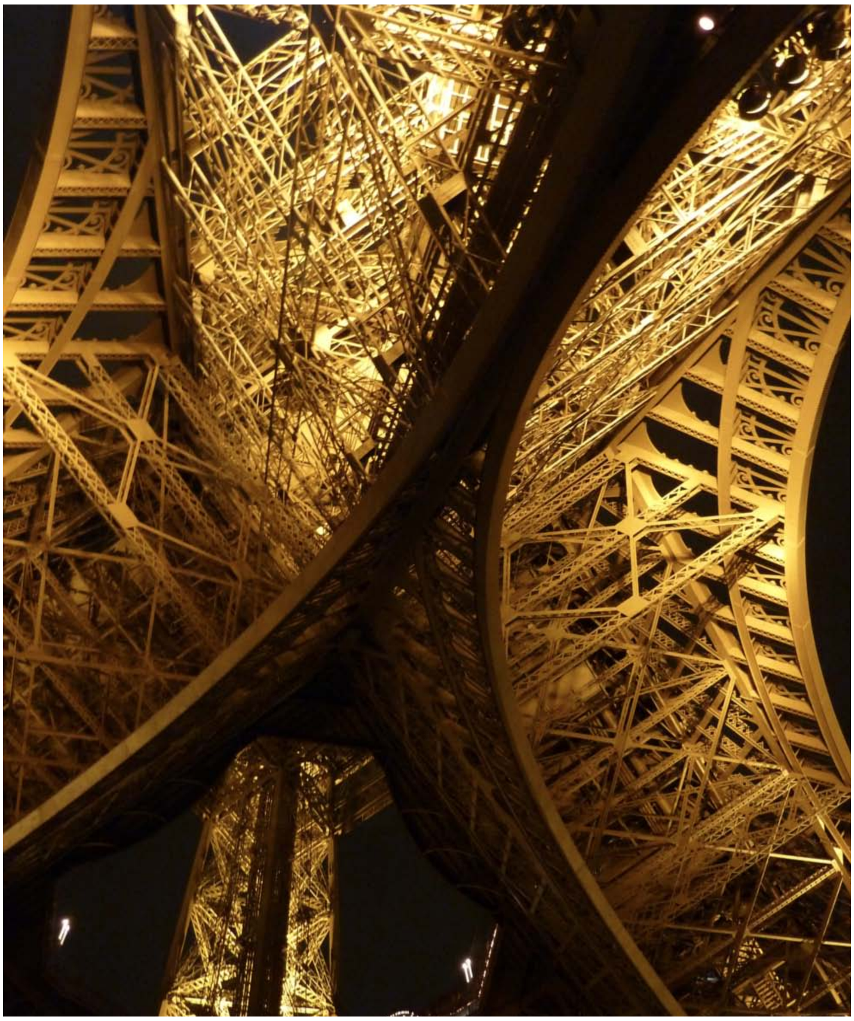
Nicolas Cheval
Unanime architectes

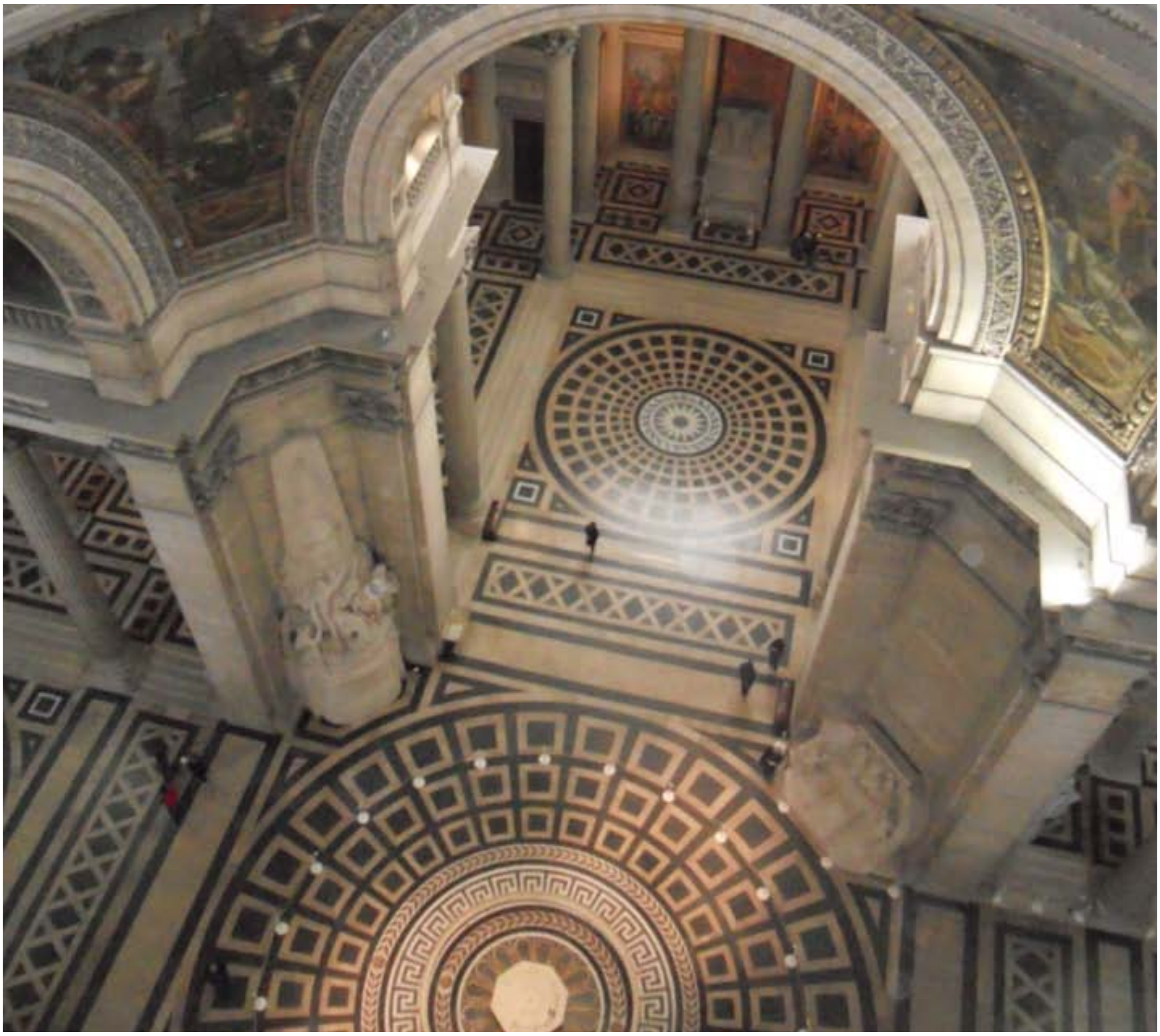
Le comité ISCARSAH s'est réuni à Paris le 28 novembre et 2 décembre 2011 en marge de l'Assemblée générale ICOMOS International qui s'est tenue cette même semaine au siège de l'UNESCO. Deux visites commentées ont été organisées à cette occasion. Les membres du comité ont été invités à découvrir la face cachée du dôme du Panthéon en présence de l'Architecte en Chef des Monuments Historiques, Daniel Lefevre, qui a exposé les principes du projet de consolidation conduit avec la collaboration de Carlo Blasi et du Laboratoire Central des Ponts et Chaussées. L'étude menée, appuyée sur des recherches exhaustives des documents historiques, a permis d'identifier la nature structurelle des désordres relevés sur les façades, les grands arcs et la triple coupole. Les observations et calculs réalisés ont révélé une sensibilité importante des maçonneries aux déformations sous charges gravitaires et thermiques, en particulier sous les effets de la poussée des voûtes et des grands arcs, accentuée par la présence d'un revêtement en pierre agrafée et des joints très fins.

La plupart des désordres se sont manifestés dès la construction de l'édifice et les plus actifs sont situés au niveau des tribunes et des galeries hautes. Cette vulnérabilité des structures a été accrue par une absence d'entretien dans le temps des couvertures qui a entrainé des entrées d'eau considérables dans les parties hautes de la structure, ainsi que des phénomènes de condensation qui ont eu raison des nombreux éléments métalliques qui composent les maçonneries.

Les travaux de consolidation qui seront réalisés dans les prochaines années porteront donc sur la réfection des couvertures, la réduction des effets thermiques et sur le traitement de la corrosion des éléments métalliques internes ainsi que sur la mise en place d'un chaînage de sécurité des coupoles.

Le comité était ensuite attendu au pied de la Tour Eiffel par Stéphane Roussin, chef du service des structures, qui a exposé les problématiques quotidiennes posées par





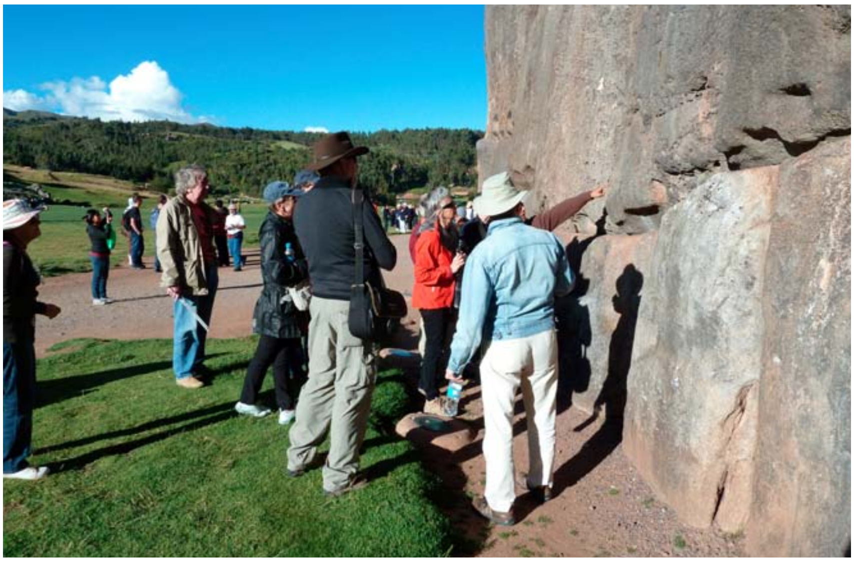
l'entretien et la conservation de ce monument hors normes. Le principal enjeu évoqué est une course contre la montre pour limiter la corrosion des éléments métalliques par des travaux de mise en peinture sous conditions extrêmes réalisés tous les 7 ans.
Lorsque certains éléments sont trop détériorés, leur replacement est parfois envisagé. Un modèle numérique aux éléments finis de l'édifice a été réalisé pour identifier les niveaux de sollicitations dans chaque partie de l'édifice et évaluer les conditions provisoires de mise en œuvre des renforcements ou remplacements. Ce dernier est complété par un système de surveillance automatisé des déformations de la structure. A l'issue de cet échange, une visite de l'édifice a permis de prendre la mesure de la tâche à accomplir.

Meeting au Pérou 20-24 Avril 2012

Pierre-Yves Caillault
Architect ACMH

En tant que membre récent d'ISCARSAH, il me revient tout naturellement de faire ce bref compte rendu de notre « escapade » au Pérou.
Ce meeting s'est déroulé en introduction de la « Terra Conference » qui a eu lieu à Lima du 23 au 27 Avril 2012.

Voyage à Cuzco et Machu Picchu 20-23 Avril
Participants :
Stephen Kelley (Président), USA ; Görun Arun, Turquie ; Maria Margarita Segarra Lagunes, Mexique/Italie ; Lyne Fontaine, Canada ; In-Souk Cho, Corée ; Alexander Salenikovich, (Russie) Quebec ; Kari Avellan, Finlande ; Ramiro Sofronie, Roumanie ; Pierre-Yves Caillault, France.
De nombreux participants étaient accompagnés (notamment pour les visites de sites et monuments).
Les sites et monuments visités intéressent principalement la période précédant l'arrivée des Espagnols au Pérou (vers 1530) ; ils témoignent d'une civilisation éradiquée par les conquistadors (et leurs alliés). Ces derniers sont encore perçus par les péruviens comme responsables de l'élimination sans pitié de la richesse de la culture passée et de leurs principaux représentants (notamment les prêtres). Les lieux visités évoquent les rites particuliers de ce peuple comme la momification mais c'est bien sur l'architecture et sa conservation qui intéresse avant tout l'ensemble des participants.
Ces sites montrent à quel point les « Incas » ont tiré parti des dispositions naturelles pour les compléter, souvent de façon spectaculaire avec des constructions en grand appareil dont la mise en œuvre nous laisse perplexe. Des blocs de granit de très grandes dimensions (certains semblent peser plusieurs dizaines de tonnes) et de formes trapézoïdales irrégulières sont appareillés avec des joints très fins qui semblent dépourvus de mortier. Les parois ainsi construites présentent un fruit prononcé et régulier ce qui nous prouve que ces réalisations répondent à une conception précise et que le mode constructif employé est parfaitement maîtrisé. Quel procédé de mise en œuvre a permis de construire des maçonneries aussi spectaculaires (la forteresse de Sacsayhuamán est construite avec des blocs pouvant peser plusieurs centaines de tonnes) ? Aucun texte, aucune illustration ne permet de le savoir.



Nombre d'entre nous s'interrogent sur la capacité de ce type de construction à résister aux tremblements de terre, principale menace pour le patrimoine bâti aujourd'hui. Nous sommes dans une région du monde où les séismes sont fréquents, conséquence de la « tectonique des plaques ». Ce même phénomène pourrait expliquer la présence de sable, voire de sel au cœur des montagnes ; les salines de Maras créent la surprise au détour du lacet d'une route de montagne.
Le prosélytisme indien dont font preuve nos différents guides ne nous empêche pas lors d'une étape aux environs de Cuzco, d'aller spontanément visiter le chantier de restauration d'une église de la période Espagnole. Ce monument qui a manifestement souffert d'un tremblement de terre fait l'objet de travaux importants : reconstruction de la toiture selon les méthodes traditionnelles (charpente en bois à peine équarris, lattis en roseau enduit de plâtre en sous-face et d'argile en surface, le tout blanchi à la chaux ; couverture en tuiles neuves traditionnelles), restauration du décor intérieur.

La « Vallée sacrée des Incas » nous mena sur plusieurs sites jusqu'à Machu Picchu. Au cœur des montagnes, ce site célèbre et spectaculaire confirme l'usage du mode constructif « trapézoïdal » : des ouvertures aux jambages inclinés, des murs avec un fruit prononcé construits en grand appareil plus ou moins régulier, une pose à joints vifs, avec de petites pierres incluses dans des réservations taillées à la rencontre de plusieurs blocs et qui semblent faire office de clé.
Ce site exceptionnel, très restauré (certaines restitutions semblent discutables) demande un entretien constant et pose la question de la conservation des ruines aménagées pour permettre une grande fréquentation touristique.

Discussions
Nous réfléchissons au meilleur mode de communication entre membres d'ISCARSAH ; certains évoquent « face book » mais nous sommes plusieurs à ne pas y être favorables à cause des dérives qui pourraient y être associées (intrusions de messages parasites, fausses informations, images diffusées sans le contrôle du signataire…) ; nous évoquons Linkedin car plusieurs d'entre nous y sont inscrits.
La question de l'admission de nouveaux membres pose le problème du maintien des membres dont l'activité s'est progressivement détachée des sujets qui nous réunissent. Nous évoquons la possibilité de procéder à une mise à jour régulière des CV de chaque membre afin que la capacité d'expertise d'ISCARSAH soit garantie. A ce propos, la faible représentation française est soulignée.
Pour mieux connaître et identifier chacun d'entre nous il serait pertinent d'éditer une liste des membres avec leurs photos.
Un projet de livre sur les fondements et l'activité d'ISCARSAH est évoqué. Nous proposons que le texte fondateur (sorte de charte) soit édité dans les trois langues d'ICOMOS : anglais, français, espagnol. Rappelons que chaque langue véhicule des concepts qui peuvent enrichir nos réflexions. Nous proposons de travailler à la traduction française.
Le projet de News Letter que nous avons évoqué peut enfin voir le jour grâce à l'initiative de Maya que nous remercions. C'est un moyen d'aborder différents sujets de réflexion pour une diffusion plus large qu'aux seuls membres d'ISCARSAH.
Je suis heureux de participer à la rédaction du n.1.

Saving The Gingerbread Houses of Haiti

Stephen Kelley
Wiss, Janney, Elstner Associates, Inc.

The Caribbean island nation of Haiti is home to a wealth of historic buildings sites and urban areas. Haiti was colonized by Spanish and French settlers, and its built heritage reflects these European colonial influences though few colonial era buildings remain. Haitians are proud of their revolution, the only successful slave rebellion in the western hemisphere.

Figure 1 - Madame Vivien Gauthier's Gingerbread House that was not damaged during the earthquake but suffers extensive termite damage (S. Kelley photo).

The 2010 Haiti earthquake was a catastrophic magnitude 7.0 Mw earthquake that occurred on 12 January. Its epicenter was approximately 25 km west of Port-au-Prince, Haiti's capital. The Haitian Government estimates that approximately 230,000 people died, 300,000 were injured, and 1,000,000 were left homeless. It is also estimated that 250,000 residences and 30,000 commercial buildings had either collapsed or were severely damaged. Another casualty of the earthquake was Haiti's cultural heritage in the form of Gingerbread houses (Fig. 1).

Figure 2 - Pictometry image of a Gingerbread House in Port-au-Prince. Since the historic district was never recorded, these images proved invaluable in identifying each property.

The use of the term "gingerbread" defines an architectural style that can be defined by the intricate architectural ornament applied to the facades of these residential structures and spans an era starting from late 19th century to the early 20th century. Intricate decorative elements are placed on eaves, balconies and porches, ridge boards, and door and window trim. Many houses feature steep spires and turrets - an architectural flourish indigenous to Haiti. Gingerbread houses from the grand to the mundane were designed by Haitian architects trained in France and borrowing colombage and pan de bois building techniques from Europe. The houses were found to be constructed of fired brick, stone, lime and clay mortars, and wood from native forests. However, by the turn of the 20th Century concrete had been introduced to the island and had all but replaced these elements as the building materials of choice. Brick making ceased thereafter. In addition Haiti today is more than 95 % deforested and has no local lumber industry. The lack of these materials and craftsman skills make these structures all the more culturally valuable.

The purpose of the initial World Monuments Fund (WMF)/ICOMOS Mission was to assess the earthquake damage to the Gingerbread district of Port-au-Prince. Led by ISCARSAH member Randolph Langenbach, the team also included members Patrick Sparks and Stephen Kelley. This Mission was also made possible by funding and co-sponsorship by Fondation Connaissance et Liberté (FOKAL), and the Prince Claus Fund for Culture and Development.

Figure 3 - The Cathedral of Port-au-Prince (1917) constructed of reinforced concrete collapsed during the earthquake (S. Kelley photo).

The assessment included more than 200 Gingerbread houses in the district. The assessment was made more efficient by the use of Pictometry which made it easy to map the district using high resolution aerial photography as the locations and quantities of the Gingerbread houses were not previously well defined (Figure 2). The assessment followed a Methodology and damage assessment forms developed by the team exclusively for use in Haiti.

How did the Gingerbread houses fare during the seismic event? They performed much better than much of the contemporary reinforced concrete construction (Figure 3). Braced frame structures were mostly left standing though frames that were fit with masonry infill lost some of this fill. Much of the severe damage was to unreinforced masonry (URM) that was a part of many of these structures. Vernacular construction techniques, such as lateral iron tie rods, actually enhanced the seismic capabilities of these houses (Figure 4).

Figure 4 - Lateral metal tie rods at the Maison Dufort kept this masonry pilaster (and the entire house) from collapsing (S. Kelley photo).

If the structures were in good repair they basically performed well. Damage could be traced to the following typical conditions: extensive termite damage; inappropriate previous repairs that were incompatible with original framing techniques, and soft lime mortars, and concrete additions that beat against the original house during the seismic event causing damage. The report of this mission, published in English, French and Spanish, can be downloaded for at no cost here:
http://www.wmf.org/dig-deeper/publication/preserving-haiti%E2%80%99s-gingerbread-houses-2010-earthquake-mission-report

Figure 5 - The Maison Dufort was left standing despite the fact that the first floor had been destroyed (S. Kelley photo).

Following the assessment, our Haitian sponsor, FOKAL, purchased the Dufort House and has embarked on a rehabilitation of the building and site for use as a building crafts training center.

The Dufort House poses unique challenges in that the first floor that is made of URM has been destroyed but the second floor and roof remain intact and only slightly undamaged (Figures 5 and 6). As stated by FOKAL President Michèle Pierre-Louis, "If this building can still be standing then we must save it."

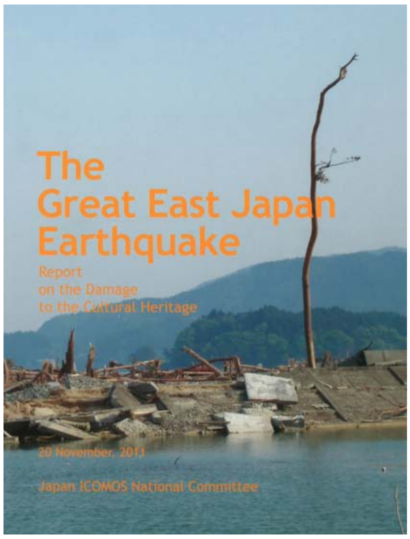
The original team members are continuing to work on this project and are focusing on seismic retrofit techniques for the first level which needs substantial reconstruction.

The Dufort House rehabilitation and seismic retrofit is still in progress.

Figure 6 - The Maison Dufort being shored for future reconstruction of the first floor walls (S. Kelley photo).

Report on the Damage to the Cultural Heritage
The Great East Japan Earthquake of March 11, 2011

Toshikazu Hanazato
Mie University, Japan/ICOMOS Japan



Damage Report of Japan ICOMOS.

Japan ICOMOS National Committee published the preliminary reconnaissance report on the damage to the cultural heritages by the Great East Japan Earthquake of March 11, 2011. This outlined report was published on November 20, 2011, being now on the Web Site of Japan ICOMOS as

http://www.japan-icomos.org/pdf/earthquake_report_20111120.pdf

Introducing the features of the devastating earthquake, it described damage to not only heritage structures but also cultural and natural landscapes. Furthermore, it dealt with damage to lots of cultural properties of fine arts & applied crafts. Introduced in the report, thousands of cultural heritages were damaged. The government started to collect information of the damage to the cultural properties just after the earthquake, and as the result, the statistics of the damage were described in this report. The emergency activities have been performed at from governmental to private level in order to rescue the damaged cultural properties. One year has already passed since the earthquake. In fact, most of the

Disaster of Tsunami (Minamisanriku-cho).

Partial Collapse of Stone Wall (Sekinoichi Sake Brewery).

Ishinomaki St. John the Apostle Orthodox Church. Severely damaged but Survived by Tsunami.

Main Building of Historic Site, Yubikan: left, before Earthquake; right, after Earthquake.

Collapse of Stone Storehouse in Makabe.

Siogama Shrine, Important Cultural Property Designated: No Damage.

governmental projects of rehabilitation, such as reconstruction of cities/towns destroyed by the tsunami, delays in starting, however, the restoration and rehabilitation stages have already come. In such social situation, some restoration projects of the cultural heritages were starting or ready to start. However, in comparison with Kobe Earthquake's experience in 1995, it would take much longer time and cost to recover from the disaster. Japan ICOMOS will hopefully prepare for publishing the following report on the restoration and rehabilitation of damaged cultural heritages.

For ISCARSAH Newsletter, damage to heritage structures is summarized as followings. In general, the main cause of the great disaster due to this major earthquake of magnitude of 9.0 was the powerful tsunami that hit the coast area of East Japan along the Pacific Ocean. Although there existed not so many heritage structures in the devastating tsunami area, some of traditional townscapes of fisherman's villages were lost, moreover, dozens of architectural heritages were swept away and severely damaged. On the other hand, the earthquake ground motions were characterized by the short predominant period and long duration, having caused serious damage to heritage structures with short natural period such as stone/brick masonry buildings and timber storehouses with thick mud-walls. Most of the traditional timber buildings with rather longer natural period, however, were not structurally affected by the strong ground motions exceeding 0.4G. Only a few vulnerable traditional timber structures collapsed during the earthquake. Furthermore, liquefaction of sandy soils caused serious damage to traditional timber buildings.

Earthquake prediction and seismic prevention for architectural heritage

Alessandro Baratta
Università di Napoli

The problem of the seismic protection of the existing building patrimony, has or not historic-artistic value, is essentially concerned with *knowledge*, particularly as regards the actual level of hazard related to the seismic threat in a definite site. This knowledge moreover -and this is a distinctive feature of the seismic problem- cannot be based, except very particular cases, on tangible data, the seismic action being occasional, transient, instant, unpredictable in the details but with effects that from such details depend significantly, and practically not reproducible a-priori in its full individuality. It follows that in the specific case the knowledge is strongly based on the philosophy, and one must interpret the knowledge as the collection of all the objective elements that contribute to form the scenario in which the seismic event occurs and acts. With the awareness that none of such elements will have the authority to determine any *necessary conclusion*, since the seismic event has the power, at its actual occurrence, to disregard of, and even to clash with, every forecast of features that could have been correctly inferred from the logical system set up, so conflicting with prediction but not denying the rationale that justifies the prediction itself.

Fig. 1 Estense Castle, Finale Emilia. Collapse of the donjon on the back.

Anyway, earthquake prediction in conjunction with seismic risk prevention actions is strongly debated, especially after recent earthquakes in Italy.

One should first specify that prediction is generally qualified by two attributes: *accuracy* and *reliability*. As far as seismic occurrence is concerned, one should consider that prevention is essentially realized through the improvement of the survival capacity of buildings, and the extension and strength of this action are conditioned by financial resources that are yearly made available. With elapsing time the residual risk of a destructive quake increases; and since the rate of earthquakes in Italy is rather high, as resources and prevention advance, so the risk and the losses.

On the other side, seismic hazard prediction usually conjugates good accuracy with poor reliability, and/or vice versa. A typical statement with poor accuracy and high reliability is: "The probability that a destructive quake (say M>5) strikes a given (wide) area is larger than P_0 (say $P_0 \geq 0.1$) in the next *n* years (say *n* =10)". In this case a good chance exists that improvement in the buildings' vulnerability will have some effect in the next n years, if the action for prevention is extended over the whole area involved by the prediction.

Fig. 2 Finale Emilia. Clock tower before the quake of May, 20.


Fig. 3 Finale Emilia. Clock tower after the quake of May, 29.

Usually this purpose conflicts with available time. If *n* is small there is no time to actuate overall reinforcement; if *n* is large there is time for seismic destruction to occur in the meantime.
On the other side the yearly financial amount that can be devoted to seismic risk mitigation is limited. If protection is applied through sporadic localized actions, it may sort no effect because earthquakes may strike other sites that have remained unprotected.
A typical statement with high accuracy and poor reliability is "The probability that a destructive quake (say M>5) strikes a given (small) area is larger than P_0 (say $P_0 \geq 0.01$) in the next *n* years (say *n* =10)". In this case the area where buildings should be improved is compatible with time and financial costs, the operation can be sustained, but it is possible that such a lumped area will not be struck by earthquakes before 200 years or more. In other words, the prevention could well be so intense to ensure that no victims will be counted in the next quake, but the costs are immediate and the benefits may be very far, and may be preceded by many other catastrophes in other sites. It is practically impossible, at the present state, to have both the attributes at a high level. In this sense, one should intend the common proposition that "*earthquakes cannot be predicted*". This is in practice the situation all over the world. We know that earthquakes will occur, and perhaps, more or less we also know when and where the next will occur. What is missing is a reliable coupling of time and space.
The solution seems to push towards a large-area action, aiming at improving the capacity of buildings as much as possible, compatibly with available times and resources, without prefixed objectives of protection, keeping the action into a sustainable domain. The result will be an improvement in the losses and in human lives saved, but anyway still many buildings and lives will be lost. The conclusion is that seismic losses can be mitigated but not annealed in a reasonable lapse of time.
Architectural Heritage is inserted in this context, but in this case the scope is to keep buildings standing up, since most times they are not inhabited and human lives can be saved, in the limit, preventing people from entering in their interior or neighbourhood. Earthquakes cannot be predicted in detail (space, time, perhaps intensity and so on). But let look at the Emilia-Romagna earthquake and at the damage that has been suffered by most monumental buildings and assume that one with a magician's crystal ball some time ago would know that after 1000 days an earthquake of Magnitude 5,9 with its actual epicentre would have shaken the region, thus predicting the time, the area, the local intensity of shaking, and everything else. After questioning some clever engineers and architects, they would probably closely describe the damage we see today.
They should say that the quake couples a strong sussultatory component to horizontal acceleration. Stability of masonry structures versus accidental (and seismic) loads is largely supported by their own weight, if this is large with respect to disturbance. In the presence of a vertical motion, the weight (but not the mass) of the building is timely reduced in some phases, while strong horizontal forces are acting. So large and extensive damage would be expected. Now the problem is what to do in the 1000 days preceding the event. Looking at the Estense castle /Fig. 1) and at the Clock Tower (Fig. 2) in Finale Emilia, and at the heavy damage they have suffered, one should ask what could be done to prevent such damage, considering that the situation is similar for other hundreds valuable objects in the region. Technicians know what to do and how to consolidate and retrofit buildings for seismic survival; many treatises and guidelines are available and can be read, studied and applied. But a preventive action at a macro-scale is somewhat different than operating on a single building. Looking at the damage in the figures above, it is easy to understand that the towers should have undergone some invasive works, possibly with the insertion of some tension-resistant prosthesis. All of this applied to all architectural heritage in the area. Potential costs, from the economical point of view, and potential losses on the cultural side, would have advised against this action. By contrast, it is possible that lighter works would have significantly mitigated the earthquake's effects, today allowing cheap recovery and refurbishment. Technically speaking, theory and practice are mature for operations; it is today possible to calculate seismic response of structures and, may be, it is also possible to predict damage. What is still unknown is what should be done before earthquakes strike down the monuments, and Research is claimed to outline an effective sustainable strategy for seismic prevention of the architectural heritage.