31 May 2019

ISCARSAH Guidelines Meeting
07 March 2019 9.00-19-00
UPC-BarcelonaTech
C. Jordi Girona 31

MINUTES of the ISCARSAH meeting on the Guidelines of the Recommendations for Analysis, Conservation and Structural Restoration of Architectural Heritage

Rectorate Building, ground floor, Lake Room
Universitat Politècnica de Catalunya, Jordi Girona street 31, Barcelona
7 March 2019 9:00-19:00

MEMBER ATTENDANCE

Görün **Arun** (President, Turkey); Alessandro **Baratta** (Italy); In-Souk **Cho** (Vice President, Korea); Vitor **Coias** (Portugal); Dina **D'Ayala** (U.K.); Anastasios **Drougkas** (Belgium); Khalid **El Harrouni** (Vice President, Morocco); Yohei **Endo** (Japan); Mehrdad **Hejazi** (Iran); Mustafa **Humo** (Bosnia-Herzegovina); Stephen **Kelley** (Secretary General, USA); Androniki Claudio **Modena** (Italy); **Miltiadou-Fezans** (Greece); Bernd **Mittnacht** (Germany); Marius **Mosoarca** (Romania); Luca **Pelà** (Spain); Satwant **Rihal** (USA); Pere **Roca** (Spain); Savvas **Saloustros** (Greece); Maria M. **Segarra-Lagunes** (Vice President, Italy-Mexico); Yaacov **Schaffer** (Israel); Marek **Sklodowski** (Poland); Daniel **Torrealva** (Peru); Julio **Vargas** (Peru); Fernando **Vegas** (Spain), and Elizabeth **Vintzileou** (Greece).

GUEST ATTENDANCE

Ileana **Corbi** (Italy), and Ottavia **Corbi** (Italy) – (members of ISCARSAH Italy)

REGRETS

Zahra **Abdollahnejad** (Iran), Umut **Almac** (Turkey), T. **Aoki** (Japan), Nataliya **Almazova** (Russia), Kari **Avellan** (Finland), Susan **Balderstone** (Australia), Maria **Bostenaru** (Romania), Scott **Brookes** (UK),Alessio **Cascardi** (Italy), Radu **Cazamir** (Romania),Orestes **Castillo** del Prado (Cuba), Amir **Čaušević** (Bosnia and Herzegovina), Rosario **Ceravolo** (Italy), Nicolas **Cheval** (France), Eun Kyung **Cho** (Korea), Milos **Drdacky** (Czech Republic), Tasos **Drougkas** (Greece),Wilfred **Ferwerda** (The Netherlands), Donald **Friedman** (USA), Robert **Frostick** (UK), Giorgia **Giardina** (Italy), Nataša Jurgec **Gurnick** (Slovenia), Toshikazu **Hanazato** (Japan), Marcela **Hurtado** (Chile); Yoshinori **Iwasaki** (Japan), Wolfram **Jaeger** (Germany), Arkadiuz **Kweicień** (Poland); Debra **Laefer** (USA), Randolph **Langenbach** (USA), Paulo B. **Lourenco** (Vice President, Portugal); Giovanni **Manieri** Elia (Italy), Arun **Menon** (India), Tim **Michiels** (Belgium), Camilla **Mileto** (Spain), Tom **Morrison** (Canada), Olimpia **Niglio** (Italy), Şerife **Özata** (Turkey), Theodorus **Palantzas** (Greece), Michele **Paradiso** (Cuba/Italy), Peter **Phillips** (Australia), Michael **Pittas** (Cyprus), Mariapaola **Riggio** (U.S.A.), Mario **Santana** Quintero (Canada), Vasilis **Sarhosis** (Greece/UK), Christiane **Schmuckle-Mollard** (France),Pierre **Smars** (Belgium), Patrick **Sparks** (USA), Päl Anders **Stensson** (Sweden), Ivan **Strelbitsky** (Russia), Hamidreza **Taravat** (Iran), Nicola **Tarque** (Peru); Will **Teron** (Canada), Ahmet **Turer** (Turkey), Stacy **Vallis** (New Zealand), Koenraad **Van Balen** (Belgium), Meltem **Vatan** (Turkey), Els **Verstrynge** (Belgium), and David **Yeomans** (UK).

1st Morning Session (9.30)

- Welcome by P. Roca and presentation of the meeting Agenda.
- The colleagues who attended the meeting introduce themselves.
- M. Segarra-Lagunes invites the members to collaborate with articles for the ISCARSAH Newsletter.
- P. Roca starts the presentation on the Guidelines:

- Presentation of the meeting purpose.
- Presentation of the background and previous documents.
- Presentation of the new Guidelines motivation.
- Presentation of the subcommittee appointed in Leuven in 2016, with P. Roca as Chair, in order to lead the elaboration of the new guidelines
- Acknowledgement of the feedback received by all contributors to the first draft of the Guidelines presented in Cusco in 2018.
- Presentation of the structure of the new document.
- Proposal of important/controversial concepts to discuss in the meeting.

Topic: Purpose and target audience of the New Guidelines

Purpose of the Guidelines, presentation of the ideas taken from the old guidelines.

G. Arun informs that ICOMOS is working on competence of experts. P. Roca suggests including this subject in final section on quality control.

D. D'Ayala makes the following comments on the general presentation of the Guidelines:

- The committee should discuss and clarify which is the target audience of the Guidelines (Architects? Engineers?). This should be clearly stated at the beginning of the Guidelines and they should be complied in a language appropriate for that target audience.
- It should be clarified which is the minimum knowledge level in order to read the document. This should be added in a preamble.
- The committee should discuss on which will be the relationship of the new document with the old one and the ISO 13822.
- She highlights the importance of limit states approach and how to relate this approach with the document.

E. Vintzileou:

- Supports the necessity for a preamble to state clearly the motivation and the target audience of the Guidelines. In particular, she suggests expressing the major motivation about the lack of education and how to cope with it through the document.
- The current draft refers often to "buildings". It is should be clear whether the document should be focuses only on buildings or monuments in general. In particular, she invites to make clear some important points like authenticity and durability.
- The Committe should discuss whether the Guidelines would address modern monuments, such as those made of reinforced concrete.

P. Roca:

- Agrees that the use of the word "building" should be reduced and the Guidelines should address monuments in general.
- Mentions that the document should be addressed to the entire multidisciplinary team under the overall guidance of an engineer or an architect.

A. Miltiadou:

- Additional end-users of the Guidelines are also the policy makers and decision-making people.

C. Modena:

- The main scope of the Guidelines is structural safety. We should address it to engineers, highlighting that it must not be based only on calculations, but on multidisciplinary activities. The document should be related to structural codes and give an indication on how to apply them to historical structures, since unfortunately they are often taken into account in an appropriate manner.
- Underlines the importance of ISO 13822 to deal with existing historical structures and the need of referring the ISCARSAH Guidelines to them.
- Informs that a specific Eurocode oriented towards the same topic is under development and is based on ISO 13822.

E. Vintzileou:

- Suggests analysing the criteria in the ISO in a very careful way while developing the guidelines.

The subcommittee in charge of the preparation of the Guidelines draft proposes that there should be further work in order to reach a consensus on the contents of the Guidelines, its target audience and its applicability.

S. Kelley:

- There is a need for this type of document in North America.
- The Guidelines should explain how to follow existing codes.

C. Modena:

- The Guidelines should contribute to avoid the prejudice that conservation and structural safety are incompatible. He says that there is this prejudice in Italy, especially for the seismic safety. Good practice should consist on intervening without changing the overall structural behavior by progressive local interventions.

Topic: Cultural Heritage Conservation and Structural Safety

P. Roca starts the discussion on the important point highlighted by C. Modena on existing prejudice that cultural heritage conservation and structural safety are not compatible. For example, there is an existing prejudice regarding the real capacity of historic buildings to resist seismic action without performing important retrofitting. P. Roca highlights the importance of stressing these ideas since the very beginning of the document.

G. Arun:

- The first stage to understand the structural behaviour is to know the construction technology.

A. Baratta:

- There is a controversy about the way to assess the safety in historical buildings; it must be different from the design of new structures. He also argues on the difficult application of existing codes to historical structures, e.g. the response spectrum analysis.

C. Modena:

- It is important to define the meaning of the structural safety in historical structures and to underline that it is not covered by codes for modern structures.

A. Miltiadou:

- The concept of preserving the "original structure" should be used with care, because it might lead to ambiguities. She poses the question on what to do when a structure was designed with defects that had produced structural problems. In such cases, we should intervene in an optimum and minimally manner. Example: ties change the structural system behavior but they are often useful. For this reason, we must be careful on how to express clearly these important ideas without any contradiction.

A. Baratta:

- The conservation should be based on the "rule of the art". This should be the starting point of the analysis. We need to analyze if the "rule of the art" is accomplished by the historical building.

E. Vintzileou:

- Selected use (reuse) of the historical structure plays an important role and should be discussed in the Guidelines.
- The selected use of the historical structure is not adequate in many cases. Often, it will not be possible to reach the safety level defined by existing codes. The Guidelines should state that, in some cases, lower safety levels may be acceptable and discuss the conditions in which such reduced levels may be accepted.

D. D'Ayala:

- If there is a structural problem, our task as engineers is to propose some solution. Our aim is to do something in a minimally and optimally way (e.g. no concrete addictions) to check the safety. We have to rely on the good faith of the structural engineer since his work should be oriented to change the behavior to the better.

M. Segarra-Lagunes:

- The document should state that prior to the design of the intervention, it is important to decode the damage history and the possible transformations occurred in a historical structure. The study of the history of the building helps to understand if the structural system has already shown to be adequate or not.

M. Humo:

- The introduction should address the engineers' tasks, their relationship with the multidisciplinary team and their activity to convince the authorities.

D. Torrealva:

- The aim should be to prepare a convincing document oriented toward structural engineers working in the field.
- The document should express in a convincing way that modern codes, and the safety levels indicated by them, may not be applicable to historical structures.

P. Roca:

- There is a section in the draft about the limitations of applying the existing codes, but we can certainly improve it to express better this important idea.

G. Arun:

- There should not be interventions in monuments without any damage only by judging from damage occurred in similar structural typologies. This led to huge mistakes in the past.

C. Modena:

- In existing structures the safety level is accepted to be lower than for new structures. When designing a new structure, we normally overdesign (assume an extra cost that is acceptable in new structures but inacceptable for existing structures).The ISO states that formalistic safety levels may be lower for existing structures than in new structures. This is linked to the fact that saving cultural values is comparable to saving money, as also reported in the Italian standards.

P. Roca proposes that the subcommittee in charge of the Guidelines should take care in introducing the above concepts in the introduction of the document and the section about structural verification.

Topic: Definition of Heritage and Social Values and Character defining elements

P. Roca presents the relevant topics:

- Use of the term “authenticity”. The updated draft tries to define where the authenticity of an original structure lies. However, the term “authenticity” is not actually a technical term as highlighted by some colleagues in their comments to the first draft of the Guidelines.
- Presentation of tangible/intangible character-defining elements. The draft of the guidelines provides examples on tangible and intangible character-defining elements as a way to identify the heritage value or “authenticity”. How may the intangible value affect our work? In fact, in historical structures we may identify intangible values related to ancient skills and practices.

A. Miltiadou:

- We have to explain what we mean for authenticity in heritage structures. We need to express the technical principles and values, compared with the social value. We can use the term “authenticity” but we need to define it better from a technical point of view.

Discussion follows on how to treat and respect the intangible aspects.

Y. Schaffer:

- Architects and archaeologists should be responsible for identifying and defining the cultural heritage values of a structure, within the context of a multidisciplinary team.

P. Roca:

- Suggests that engineers should contribute to identify character-defining elements (e.g. construction details). He presents the example of construction joints in Gothic cathedrals: engineers might be more sensibility than other experts in appreciate some character-defining elements.

S. Kelley:

- UNESCO uses the term "authenticity". In North America, we use "integrity". We can use both terms in the Guidelines.
- The definitions of the intangible elements are often controversial. In his opinion, the original use and function is tangible. Intangible characters are more difficult to identify. He suggests to review their definition in the draft

M. Sklodowski:

- Supports the idea that the architects and historians should provide the information regarding the intangible values.

2nd Morning Session (11.40)

Topic: Minimal/Minimum/Optimal (necessary) Intervention

P. Roca starts the discussion on the terminology for the definition of the proposed intervention. The new Guidelines should attempt to give a definition for the "minimal intervention", which was not included in past ones. He presents the contributions by A. Miltiadou and P. Smars. He invites to discuss about the definition first, and then about the process to accomplish it.

E. Vintzileou:

- Highlights the difficulties related to the right definition of the concept and asks the help from native speakers to express it correctly. The use of minimal might be associated to a non-important intervention. The term "minimum" might be misinterpreted since proper interventions might fall outside this definition, e.g. grouting, even in cases they could be adequate and correct. The point should be in explaining what it acceptable and what is not. There should be a discussion on the "necessary" and "unnecessary" interventions.

S. Kelley:

- The proper term should be "minimum necessary". This is a well-established term in art conservation in North America.

In-Souk Cho & A. Miltiadou:

- Support the term "optimal"

M. Sklodowski:

- Prefers "minimum necessary", since the process is optimal instead.

D. D'Ayala:

- Considers that "optimal" is a better term that applies to the safety of the structure. UNESCO says that the intervention must be of high quality and so we can avoid our apologizing attitude by avoiding both "minimum" and "minimal".

M. Humo:

- The word "minimum" should be included in the definition because it controls the intervention size and discourages excessive interventions.

C. Modena:

- The definition should not only limit to the concept of the optimization, but it should also give a message about the size and the type of the intervention.

F. Vegas & M. Hejazi:

- Agree by saying that minimum implies optimal.

E. Vintzileou:

- It is impossible to define in an engineering way the word "minimal" or "minimum". All interventions should be justified and fully supported by the necessary documentation. Then the authorities should take the decision on the level of interventions. The engineers should just provide all the necessary information and solution.

C. Modena:

- The main topic should be the definition of the necessary safety level. He suggests using "minimum for the accepted safety level".

A. Miltiadou:

- The point is to reach the maximum safety level through the minimum optimal intervention.

Y. Schaffer:

- Proposes the term "structural feasible intervention".

J. Vargas:

- It is difficult to define the intervention as "optimal" in seismic regions. In those cases, "minimal/minimum" makes more sense

S. Kelley:

- The word "optimal" or "optimum" means the best. This might be dangerous. He supports the "minimum" intervention to stress the minimum effect on heritage value.

P. Roca:

- Supports the term "minimum/minimal". A "minimum/minimal" intervention is the one among all the possible with the minimal impact on the heritage value.

D. D'Ayala:

- The approach for interventions is shifting nowadays and people look to how the intervention enhances the heritage value. Maximizing the heritage value by improving the safety level may be achieved by a high quality intervention.

A. Miltiadou:

- The “optimal” intervention should consider all the heritage values of the monuments and not only the engineering ones. It refers to the multidisciplinary character of the intervention. The term “minimum” is rather subjective.

V. Coias:

- The term “optimal” is dangerous for two reasons. First, the engineer might feel authorized to go beyond the minimum. Second, the contractor will always push towards a major intervention instead of a minimum one. The proposed solution has to be “minimum” and then we need to explain after the statement in which sense it is optimal.

C. Modena:

- Supports again the term “minimum” and underlines the importance of providing a clear definition for it. The main purpose should be to avoid overdesign.

P. Roca:

- Summarizes all the comments and expresses that the majority supports the use of “minimum”. He suggests also “minimum necessary”.
- The document should include a clear definition of the “minimum (necessary) intervention”.
- The document should state that the “minimum (necessary) intervention” is the result of an optimization process.
- He acknowledges all the contributions and says that the subcommittee will follow all the suggestions and will be sensitive to the valuable feedback received. In particular, he recognizes that the comment by D. D’Ayala on the new understanding of the concept of intervention is very important and the working group will consider it.

S. Kelley:

- Suggests to change “the best protection” with “the maximum protection”, or “enhancement” as suggested by D. D’Ayala.

P. Roca presents the contents of the Guidelines related to minimum intervention.

E. Vintzileou:

- The correct criteria, the thorough documentation and justified proposals can protect from wrong interventions.

Topic: Limitations of existing codes.

P. Roca:

- Starts the discussion and comments that this part of the document is largely based on the past Guidelines. Too conservative approaches, as those conventionally used for new structures, would imply an excessive cost on heritage value.

F. Vegas:

- Suggestion to change the term “conservative approaches” with another one. Conservative might be confused with something in agreement with conservation principles. There is also the need to strengthen the “over dimensioned” or “over designed” meaning.

D. D'Ayala:

- Mentions that new codes are not more "conservative", e.g. ULS approach is economical and not conservative. The document should avoid stating that new codes are conservative.

E. Vintzileou:

- The term "conservative" is quite common in engineering jargon and its use will not be confusing.

P. Roca:

- Agrees and expresses the general feeling that "conservative" is the proper term.

Topic: Application of the scientific method.

M. Segarra:

- Proposes to change the wording "possible documentary sources" to "all kind of documentary sources" in the part about historical research.

There is a discussion on whether the structural verification should be or not a part of the diagnosis process. Presentation of terminology given by ISO 13822.

P. Roca:

- Comments on how to state correctly the different phases of the diagnosis process, compared with ISO and previous guidelines.
- Suggests to comply with ISO by including "Structural Verification" into the diagnosis phase, but to present a separate chapter to explain it carefully, perhaps calling it "structural assessment" instead of "diagnosis".

D. D'Ayala:

- Mentions that the cyclic nature of the assessment process is missing. Diagnosis is a circular process and not linear, according to the overall optimization process. The participants agree in that this is a key concept that should be included in this part of the document.

A. Miltiadou:

- Suggests retrieving other terms used in the previous Guidelines, like anamnesis, diagnosis, therapy, control and assessment.

1st Afternoon session (14.00)

Topic: Diagnosis

P. Roca reopens the discussion about the stages of the scientific approach with a short presentation of the part on the Diagnosis. He mentions points questioned about inspection, like the concerns about the costs of the field research and the need for criteria to limit it. He poses the question on which tests should be included as necessary for the Diagnosis.

E. Vintzileou:

- The Guidelines may include a list of tests to consider in the diagnosis. The list will not be compulsory and exhaustive. This does not necessarily mean that we need to execute all the experiments for all similar

structures. For instance, in case of simple regular buildings in regular nuclei some simplifications are possible.

A. Miltiadou:

- Stresses the importance of the elaboration of the inspection plan, already highlighted in the document. In-situ inspection should be the first and obligatory part of the process and a necessary basis for the design of the necessary in situ and laboratory investigations. The planning activity is essential to get a sufficiently high knowledge level and to conceive the necessary intervention.

P. Roca

- Suggests highlighting the strong link between the preliminary inspection and structural analysis.

S. Kelley:

- The engineer should provide a list of the necessary experiments and then leave to the owner the choice of how to invest the money.

A. Miltiadou:

- The engineer should propose and try to perform the investigations.
- In case of building nuclei, the municipality should be encouraged to run the necessary tests that are common for all the structures (soil, construction materials), thus reducing the cost for each individual case.

Topic: Monitoring

P. Roca introduces the topic. He mentions that specifying a minimum period for monitoring may be misleading, and thus is not necessary.
There is a consensus that we can use a more general indication of time length.

Topic: Structural performance verification

P. Roca presents the contents of the document on the specific part.
A discussion on the following paragraphs of the Guidelines:
"The adequate performance of the structure must be evaluated taking into account three different but intimately related targets:
(1) The safety of people at risk

(2) The maximum possible safeguard of valuable immovable cultural and artistic contents

(3) The integrity of the structure itself as cultural heritage object with the least possible alteration"

C. Modena:

- There is a difficulty in defining the (2) and the (3) targets for the structural performance verification. He suggests being more specific on these two points. The complexity of the topic is very high since it is even difficult to define proper limit states for these aspects. For example, if there are frescos, we may establish some limit states of deformation but this would imply a stiffer structure.

A. Miltiadou:

- The Guidelines should mention/discuss on the acceptable damage level. This definition should consider the acceptable damage level affecting the artistic components (e.g. mosaics), as it should be lower than in other buildings. She mentions the possible relationship between the damage acceptance criteria and the importance of the monument or the number of visitors.

S. Rihal:

- The second target can be expanded using threshold levels of damage/acceleration/displacement from past earthquakes.

P. Roca:

- Highlights the need for presenting the complexity of the problem.
- Presents a comment from P. Sparks regarding the definition of structural verification.
- Specific serviceability limit states oriented to limit deformation and cracking must be considered, as already mentioned by the ISO. We need to define acceptable damage levels and target reliability levels.
- Suggests defining further criteria on how to set damage levels and reliability levels.
- We all agree that we can accept safety reliability levels that are lower than in building design codes. In this case, we can adopt parallel measures such as restricted access or different use of the building, as also suggested by the ISO.

C. Modena:

- The establishment of the safety level is the task of the codes. In the Eurocodes, the safety levels are defined at the National level.

A. Miltiadou:

- There might be a contradiction between lowering the safety reliability level and minimum thresholds of acceptable damage. We have to address carefully this point.

P. Roca:

- After structural reliability, he proposes to add a section on “Actions”. It can be short and then enlarged accordingly with an Annex.

C. Modena:

- Suggests to avoid the definition of “Actions” and especially the seismic ones.

M. Sklodowski:

- Exceptional “Actions” are not predictable, such as terrorism, explosions, hurricanes, flooding, etc.

C. Modena:

- The document should make clear that it is addressed not only to important monuments but also to minor historical structures.

S. Kelley

- Suggests simplifying this paragraph.

Topic: Proposed approach for structural verification

P. Roca goes through part 3.8 of the document. He did not receive so many comments. The main difficulty is actually how to combine the different analysis approaches to get the final solution. He also mentions the possibility to skip the section on satisfactory past performance since it may be hardly applicable to historical structures.

E. Vintzileou:

- Satisfactory performance of the structure in the past does not mean that there is no need for intervention.

A. Miltidiadou:

- Says that this concept is actually more suitable for recent buildings.

A. Baratta:

- The word "rule of art" should be used instead of "construction practice".

The participants agree to remove the assessment based on satisfactory past performance.

Topic: Model calibration.

P. Roca introduces the section on model calibration and the possibilities mentioned to carry it out.

E. Vintzileou:

- Says that there is often a sort of incompatibility between the use of very detailed models and the approximate calibration of the input data.
- The structural verification should not focus only on numerical models.

Topic: Synthesis of approaches

P. Roca:

- Provides some ideas on how to combine the information derived from the four different approaches. He proposes the synthesis of the approaches based on the ISO through consistency (lack of contradiction among results through plausibility check), completeness and corroboration (need for redundancy in information).

D. D'Ayala:

- It is important to state that the process to take the decision needs to be formalized and justified at each step. She proposes an approach similar to that based on the use of weight factors.

The participants agrees in that the subcommittee to elaborate a proposal for a more formalized process for the synthesis of the approaches.

Topic: Intervention Criteria

P. Roca opens the discussion on intervention criteria. The discussion on the terminology is left to the subcommittee. For example, the use of "removability" should be preferred instead of "reversibility". Removability implies some limited damage after removal; reversibility considers no damage after removal. Other concepts are mentioned: re-interventionality (referring to non-removable intervention as suggested by

A. Miltiadou), feasibility, controllability, sustainability.

A. Miltiadou:
- Explains her understanding of the term "re-interventionality" that may apply to techniques that are not removable, e.g. grouting.

E. Vintzileou:
- It may be not necessary to include this term because the concept can be covered by all other criteria.

M. Segarra:
- Suggests mentioning wrong and right examples for "re-interventionality".

Y. Schaffer:
- This definition of "re-interventionality" may suggest the improvement of existing and non-removable interventions.

P. Roca:
- The definition should leave open the possibility to apply new interventions. He suggests changing the context and defining that any intervention should not compromise any future intervention.

There is a consensus on removing the part in the definition of "re-interventionality" that specifies that this concept is applicable to non-removable interventions.

S. Kelley:
- Proposes the use of "retreatability" instead of re-interventionality, since it is a term more popular among conservators.

D. D'Ayala:
- Suggests the addition of a paragraph on non-removable interventions. This section should specify that non-removable interventions should comply with all the aforementioned other criteria.

Topic: Reparability.

C. Modena
- Introduces the concept of "reparability".
- Suggests thinking about interventions that allow future reparations or maintenance after every critical damaging event. He mentions that the idea arose from the post-earthquake interventions in the Umbria-Marche in Italy.
- He says that the concept of "maintenance" should include also structural interventions, for this reason he had suggested the term "reparability".

A. Miltiadou

- Indicates that this concept is very similar or even equivalent to that of retreatability. Another possibility is to call it pre- and post- disaster structural maintainability.

J. Vargas:

- Says that we need to highlight the importance of pre-maintenance, i.e. the preventive interventions since they are more advantageous from the economical point of view. Risk assessment may reveal how to allocate the available resources for mitigation prior to disasters.

G. Arun:

- This section of the Guidelines seems more oriented to owners and stakeholders than to engineers. This concept may be included in the maintenance program since it is task of the owner.

D. D'Ayala:

- Suggests talking about "natural hazards" and "man-made disasters", rather than the word "natural disasters".

C. Modena:

- "Reparability" is a more general topic than maintenance. The lack of maintenance contributes to increase the vulnerability.

M. Sklodowski, F. Vegas and M. Hejazi support the "reparability" term, as suggested by Claudio.

M. Humo:

- Proposes to clarify this new concept through practical examples.

There is no consensus on whether "reparability" is a concept or action. In the second case, "structural maintenance" may be the proper term. P. Roca proposes that the subcommittee analyses further the problem, since there is no clear agreement from the audience on one term instead of another.

2nd Afternoon Session (16:45)

Topic: Minimal intervention

P. Roca reopens the discussion about minimum intervention. He shows a flowchart, still not contained in the document, defining the framework for the application of the engineering approach leading to the selection of the minimum intervention. The flowchart includes the following points:

- definition of reliability levels;
- evaluation of alternative solutions;
- selection of the solution with minimum cost on heritage values;
- if the solution is satisfactorily "minimal" in the sense that its benefits are clearly far higher that the costs , we proceed adopting the satisfactory minimal intervention;
- otherwise the structural requirements should be reconsidered and, if reduced, and complementary measures should be taken, such as restricted uses, etc.

P. Roca suggests providing some proposals on how to meet the minimum intervention.
There is a discussion on the word "cost" into the flowchart since it might be misleading. After the comments by C. Modena, P. Roca suggests using preferably the word "impact" instead of "costs".
There is a consensus that flowchart should be used in the Guidelines.

M. Sklodowki:

- Suggests using “Heritage values” throughout the entire document to homogenize the terminology, instead of “Cultural values”.

F. Vegas:

- Offers to share a qualitative tool to categorize and formalize the process that is included in a Spanish handbook not yet published.

Topic: implementation of an incremental approach.

A. Miltiadou introduces the discussion on the incremental approach intended as a process that begins with a minimum level of intervention and after which subsequent supplementary and corrective measures may be taken.

M. Segarra:

- Suggests using “step-by-step procedure” instead of “incremental”.

C. Modena

- Presents a previous successful experience in Italy based on monitoring.

C. Modena and A. Baratta

- It should be indicated that this approach is not applicable to seismic strengthening.

A. Miltiadou:

- During the first steps of an intervention you can obtain important information on which you can build up. This might provide for a specific type of intervention based on subsequent steps.

The participants agree in that the concept proposed by A. Miltiadou, even if it does not coincide with that of incremental approach, is interesting and could be mentioned in another section in the document.

Topic: Impact of interventions on cultural value

P. Roca presents a tentative categorization:

- “Interventions with null or very low impact on cultural value “
- “Interventions with moderate impact on cultural value “
- “interventions with high impact on cultural value “

Discussion on “Interventions with null or very low impact on cultural value”

While talking about interventions with null or very low impact on cultural value, the some participants indicate that even these interventions may involve a change of mechanical and resistant features of the structures, e.g. steel ties.

G. Arun:

- Suggests deleting “consolidating” interventions or to explain its meaning, besides the repair interventions.

F. Vegas:

- Suggests explaining better what repair is, in order to avoid confusion with “removal” and “substitution” even with traditional materials. He presents the example of frequent unnecessary joint repointing interventions.

S. Kelley:

- Suggests using “appropriate conventional techniques” instead of just “conventional techniques”.

In-Souk:

- Presents her view about “historical materials” and sustainable techniques in Korea regarding timber structures. In this specific case, the original material cannot be found anymore.
- She also suggests to use “joinery” for timber structures, besides “ties” for masonry ones.

Y. Schaffer:

- The Guidelines should provide examples of interventions, as well as preventive and regular maintenance.

The participants agree in trying to prepare examples for each case.

P. Roca:

- Suggests considering ties, joinery, grouting, and confinement of columns as possible examples of low impact interventions.
- Examples for moderate and high impact interventions are more difficult to be identified.

S. Kelley:

- Suggests using “local traditional constructional materials” instead of adequate mortars or grouts in order to cover RC historical structures. For example, Portland cement is considered an historical material in Chicago.

A. Baratta:

- Mentions the special case of seismic isolation.

P. Roca:

- Says that seismic isolation is a high impact intervention affecting the foundations that are also part of the heritage value of the building, as already expressed by the document.

Discussion on the “Interventions with moderate impact on cultural value”

P. Roca:

- Presents the case of moderate impact interventions. They may not be removable but easy repairable in case of their removal.
- He suggests reinforcement with textile Reinforced Mortar (TRM) as possible example. After some discussion, he suggests omitting this example since it is still controversial and requires further research.

M. Humo:

- Suggests wood planking as a better example for moderate impact intervention. There is a consensus on this proposal.

The participants agree to use general examples without specifying every type of intervention.

E. Vintzileou:

- Suggests mentioning good practice of any technique in the text.

D. D'Ayala:

- Suggests to reconsider the wording of "fully non-invasive".

Discussion on the "Interventions with high impact on cultural value"

D. D'Ayala:

- Suggests changing the wording of "significant damage" with "excessive alteration". Some damage produced by beneficial interventions may be accepted (as for instance the damage caused by providing ties and adequate floor planks connected to walls in existing buildings without box behavior).

M. Sklodowski:

- Suggests that the document should report positive examples, to transmit the idea that a proper intervention can have a very positive effect on the structure.

P. Roca:

- Wonders if we should make examples for the high impact interventions. It is a complex activity, since there are controversial interventions.
- Asks for contributions on examples on this topic.

S. Kelley:

- Asks all the participants to contribute on this topic by giving examples for each category.
- Sends an e-mail to ISCARSAH members about possible examples based upon their experience (including region and the materials and systems) of the three categories.

Topic: Proposals for New Sections and Annexes

P. Roa indicates that V. Coias and Y. Schaffer are proposing some additions which could be included in a section on quality assurance.

V. Coias:

- Highlights the need for qualification, skill and capability of people working in the job front.

Y. Schaffer presents three topics:

- The first one is about avoiding inadequate changes during the project due to technical and financial constraints.
- The second is the need for site engineers with expertise in the field of conservation.
- The third is to present the conservation principles or concepts applied in the conservation project, e.g. at the beginning of the explanatory report.

M. Humo:

- Presents a proposal for Annex 6 on the Check List that should be filled by the engineers.ç

P. Roca:

- The suggestions from Y. Schaffer, V. Coias, M. Humo should be included in a new Quality assurance section.

Topic: Explanatory Report

P. Roca introduces the section on the explanatory report with the items to include in it. The report should involve all the members of the multidisciplinary team and be signed by them. This part is based on the previous Guidelines.

E. Vintzileou:

- The committee needs to define better the target of the whole document, the applicability of the guidelines and to add a list of definitions (glossary).

Closure of the meeting

Closure of the meeting by P. Roca. He proposes the next steps to follow in order to advance in the elaboration of the document.

- Compilation of all the information by the working group responsible for the preparation of the Guidelines.
- To further elaborate the document in a meeting of the subcommittee.

E. Vintzileou and A. Miltiadou propose to organize the subcommittee meeting in Athens in a date within April to July 2019.