Florence Heri-Tech – The Future of Heritage Science and Technologies

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Preface

Under the patronage of the University of Florence and organized with the support of the Department of Industrial Engineering, Florence Heri-Tech gathered researchers and experts in the field of "heritage science and related technologies" to disseminate their recent research at an international level as well as to draw new inspiration.

The Conference was part of the Florence International Biennal for Art and Restoration, an international event attracting prestigious institutions and companies and creating a unique opportunity to bring together the academic world with industry.

Florence Heri-Tech ultimate goal was to foster European mobility and co-operation between students and staff, to enhance Europe's development as a multi-cultural society and to encourage the concept that scientific-cultural research must be an integral part of society. Moreover, the Conference aimed to promote international networks between universities, training institutes and companies to create long-term collaboration opportunities.

The topics cover experiences in the use of innovative technologies and methods for documenting, managing, preserving and communicating cultural heritage.

Eighty three experts, coordinated by the General Chairs and supported by a high-level Scientific Committee, were involved in the review process which led to the selection of 112 papers (out of 173 submissions) focusing on multi-disciplinary and inter-disciplinary research concerning future trends in material science, engineering-related methods for Cultural Heritage, diagnostic and monitoring as well as digital heritage.

The Honorary Chairs, Prof. Piero Baglioni, Prof. Giorgio Bonsanti, Prof. Vito Cappellini, Prof. Sharon Cather, Prof. Marco Ciatti, Prof. Maria Perla Colombini, Prof. Luigi Dei, Prof. Rodrigues Jose Delgado, Prof. Mario Primicerio, Prof. Pedro Santos, Prof. Antonio Sgamellotti, which are renowned experts in their research fields, further enhanced the Conference prestige.

General Chairs extend their thanks to all authors, speakers, and those persons whose labour, financial support and encouragement made the Florence Heri-Tech event possible.

Florence Heri-Tech Chairs

Rocco Furferi

Rodorico Giorgi

Lapo Governi

Mauro Matteini

Yary Volpe

Organizing Committee

Organizing Committee

Peer review statement

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Peer review statement

All papers published in this volume of *IOP Conference Series: Materials Science and Engineering* have been peer reviewed through processes administered by the proceedings Editors. Reviews were conducted by expert referees to the professional and scientific standards expected of a proceedings journal published by IOP Publishing.

Dr. Sara Goidanich, Dr. Petiti, Dr. Toniolo: *Sensors for real-time, on site corrosion monitoring of metallic works of art*

Dr. Mario Taddei *Digital restoration of the Last Supper and multimedia tools to experience edutainment*

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Vulnerability assessment of cultural heritage sites towards flooding events

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Abstract. Historic sites are threatened by diverse weather patterns, mainly due to global climate change, such as sea-level rise and increasing frequency of storms and other extreme precipitation events. As climate change is becoming an increasing urban problem, heritage located in this context is considered as a sensitive and vulnerable element of the city. Adaptation should be oriented to a sustainable transformation of the historic city, leading to more resilient and safe environments. Risk-based approaches should incorporate an assessment of sensitiveness and capacity to adapt to these hazards. Vulnerability is often assessed on a large scale (e.g. regional, local) and buildings are not considered as part of the urban environment, while conservation is often developed on the operational scale of a monument or site. Management of cultural heritage requires therefore for an urban approach, which considers all the elements and buildings as part of the urban environment. Research presented in this paper describes a methodological approach (MIVES - Integrated Value Model for Sustainability Assessment) for vulnerability assessment of historic sites, supported by multilevel indicators (urban, building, element), in order to provide an informed decision-making. The solution proposed in based on an organised and structures decision tree, which provides a comparable and unique vulnerability index on the building level.

1. Introduction

Climate change adaptation, disaster risk reduction and cultural heritage preservation respond to the objectives of urban sustainable development [1] and aim at giving priority to people's quality of life improvement. Even if the topics are related to different fields of knowledge and competences, sustainable development can be reached only through a holistic approach, which considers all transformations and processes of change. In this context, the Sendai Framework [2] discusses the importance of understanding disaster risk, in all of its dimensions of vulnerability, adaptive capacity and

the parameters compared to the whole category and the availability of relevant information and semantic information completed and extrapolated to the whole category. As a result, the vulnerability index was calculated according to the values assigned to the variables of each indicator and the weights attached to each branch of the requirement tree.

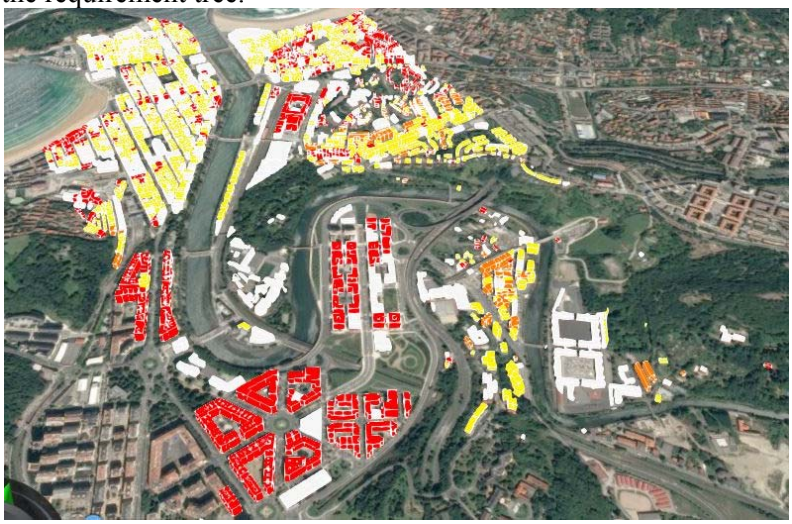

Figure 4. Graphical representation of the lots' vulnerabilities

In order to verify the accuracy of the results of the methodology proposed, a survey campaign was carried out on 100 buildings with the objective of comparing results given by real data and the categorization method. The margin of error resulted in a 9% and the largest difference was appreciated in one of the districts, which is mainly characterized by single-family houses of diverse characteristics, while the methodology shows its highest potential on districts which have been characterized by a smooth development and present similarities.

6. Conclusions

In vulnerability assessment of historic buildings towards flooding, decision-making is a complex process in which several disciplines and interests intervene, leading to a difficult exercise of comparison and evaluation. Local governments are more and more keen to have accurate results with the minimum efforts. A balance among data acquisition and accuracy of results to include the relevant information in a unique model or platform is essential for the decision-making process. Furthermore, multiple criteria decision analysis (MCDA) process helps decision-maker in improving the objectivity and quality of results by providing a systemic and organised way of thinking. Research proposed has established a hierarchic structure based on a requirements tree, in order to provide decision-making with an objective intervention priority index, in which the characteristics of the vulnerability assessment are defined, displayed and organized. A method for the fine-tuning of the methodology, on the one hand, considering the sensitiveness index and, on the other hand, the adaptive capacity index, has been established, providing vulnerability levels defined by these parameters.

7. Acknowledgements

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References

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