Construction Safety and Risk Analysis

Applications to bridges, buildings, cultural heritage, and infrastructures

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Permanent/temporary staff: 43% permanent staff / 57% temporary staff

School of Architecture and Design
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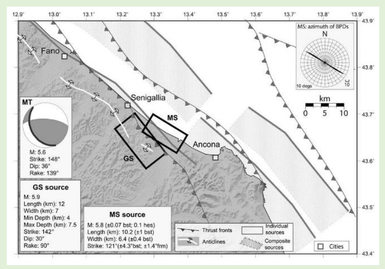
Characterizing studies

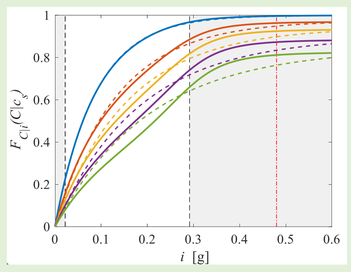
Safety assessment of bridges, buildings, and infrastructures as well as protection of cultural heritage considering different sources of risk. Research activities: i) methods for risk assessment and models definition for hazard, vulnerability and exposure at different scales, considering extreme natural phenomena; ii) probabilistic analysis and algorithms to evaluate the safety of complex structural systems and their evolution in varying environments conditions; iii) predictive models of structural response of bridges, buildings, infrastructures, and cultural heritage; iv) design of new structures including innovative resistant systems; v) safety assessment of existing structures and cultural heritage and their conservation; vi) structural monitoring for condition-based evaluation and maintenance.

Seismic hazard a territorial scale

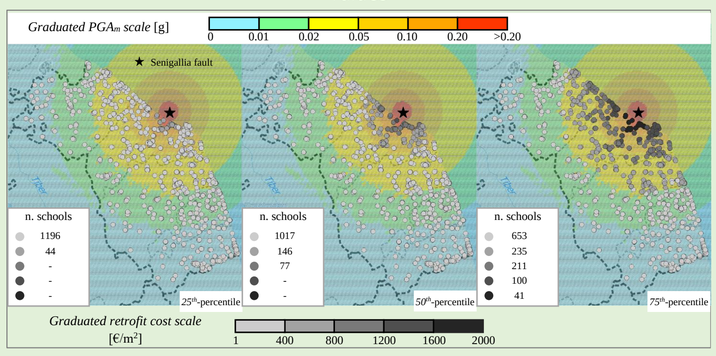
Seismic source



Vulnerability curves



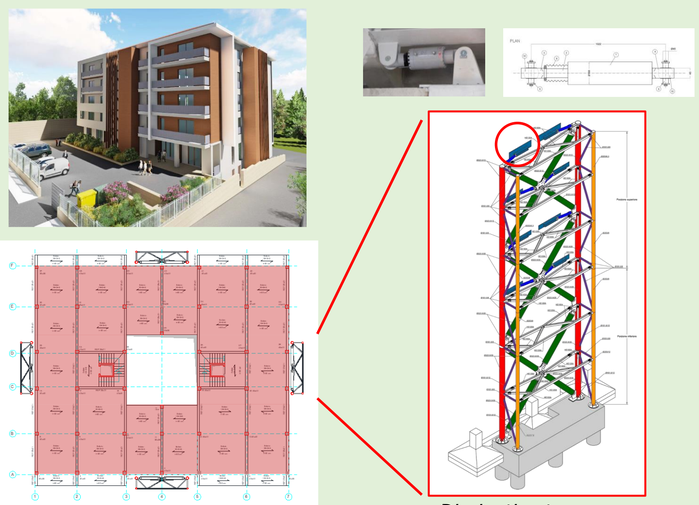
Map of the Marche region schools characterized by 25%, 50% and 75% probabilities of observing a cost per square meter lower than certain values



Fazzini building

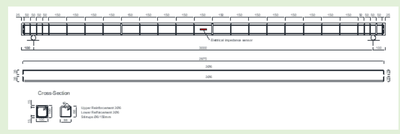
Current condition of the building

Seismic and energy improvement solution

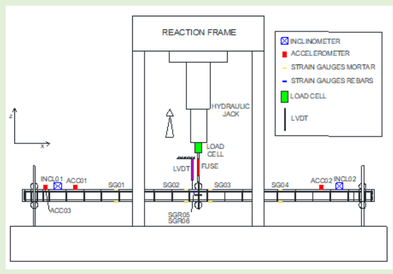


Laboratory test on self sensing material

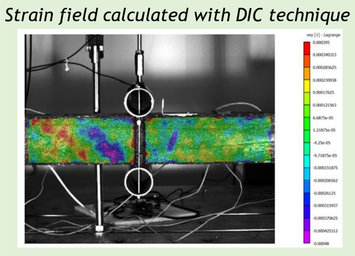
Tested beam

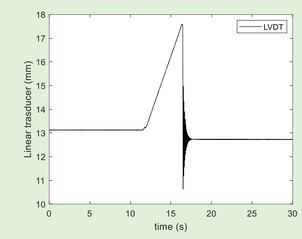


Test Scheme



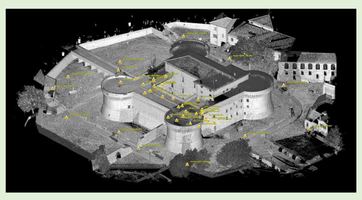
Strain field calculated with DIC technique



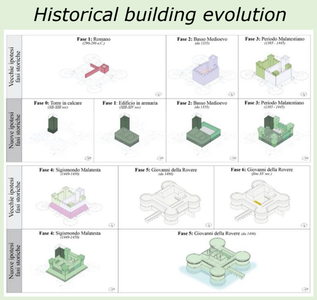


National and International Impact: advancements in risk and hazard description and evaluation of the performance of new and heritage structures, definition of procedures for the design of new structures including innovative resistant systems, improvement of procedures for structural health monitoring.
Sources of funding: European Union, Italian Ministry of University and Research, Italian Ministry of Culture, Public and Private Companies involved in the management of buildings and infrastructures.
International collaborations: University of California San Diego, University of California Davis, Oregon State University, Stanford University, Rice University, Louisiana State University, University of Strathclyde, University College of London, RWTH Aachen, Hasselt University, University of Thessaly.
National networks: FABRE Consortium, ReLUIS Consortium, STRIC.

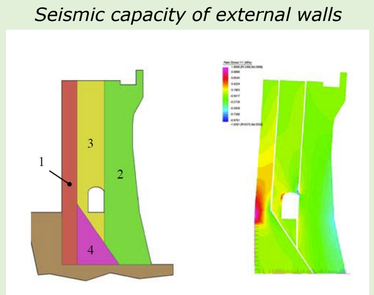
Rocca Roveresca Senigallia



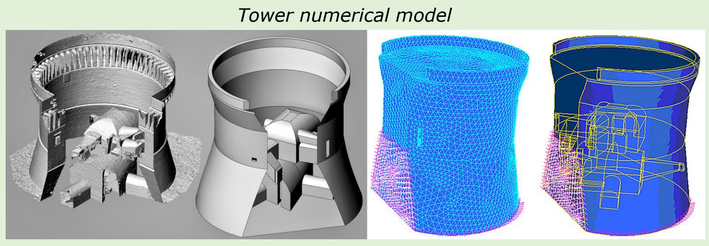
Historical building evolution



Seismic capacity of external walls

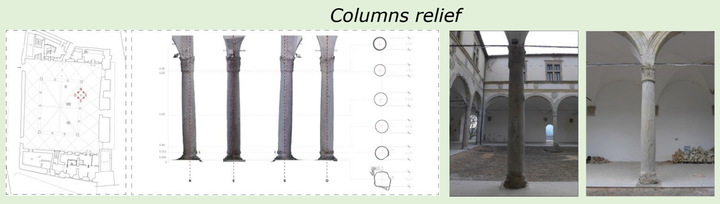


Tower numerical model

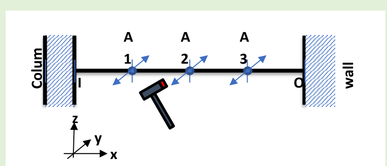


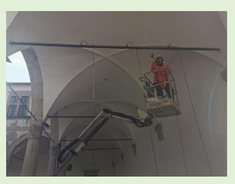
Camerino Ducal Palace

Columns relief



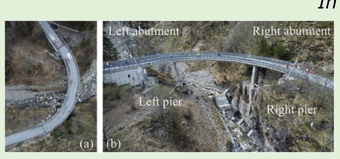
Tie road vault tests

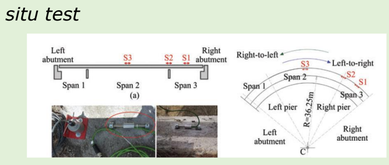




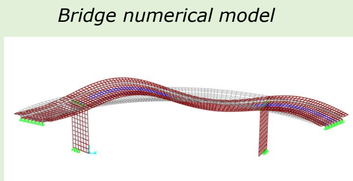
Monesi Bridge

In situ test





Bridge numerical model



Experimental dynamic identification