Finanziato dall'Unione europea NextGenerationEU
Italiadomani PIANO NAZIONALE DI RIPRESA E RESILIENZA
Ministero dell'Università e della Ricerca

Acronym – MURATORI

Title - Multiscale and mUltidisciplinaRy Approach for hisTOrical centres ResIlience

Scientific coordinator – Daniele Baraldi

Department – Department of Architecture and Arts

ERC sector – PE8

Strategic emerging topic – Environment Quality

Cluster – Civil Security for Society

Iuav role – lead partner

Other partners – "Roma Tre" University of Rome

Duration – 24 months

Start – 30/11/2023

Closure – 29/11/2025

Project budget – € 224 904.00

Iuav budget – € 116 499.00

Funding to Iuav – € 116 499.00

Source of funding – MUR (Ministry of University and Research) - Call PRIN 2022 PNRR

Description – The research proposes an innovative, multidisciplinary, and multiscale methodology for analyzing historical centres, aimed at improving their resilience and reducing their vulnerability against seismic actions. The Italian territory has a large amount of historical town centres, collecting most of national built heritage, monuments and minor architecture, having a considerable cultural, social and economic value. Most of these centres are vulnerable to seismic actions and periodic catastrophic events demonstrated the need for effective and efficient strategies for their preservation and resilience. However, the damage caused by a seismic event is not only due to singular building collapses, but also by their consequences on the surrounding complex built environment typical of historical town centres. Therefore, vulnerability analyses need to be extended from singular buildings to the urban scale.

The proposed methodology will be particularly addressed to the Minimum Urban Structure (MUS) of the historical centre, made of strategic buildings, roads, networks, spaces, which must remain functional during and after a seismic event, allowing to manage the emergency and drive reconstruction plans. The research is based on an extensive analysis of the centre that allows to create an accurate numerical model able to predict damage scenarios and preparatory to the design of an in-time Structural Health Monitoring (SHM) framework of the MUS.

Objectives – The final goal of the project is to propose a SHM framework of the MUS of a historical centre, which can become a system equivalent to the Seismic Observatory of Structures, applied to urban scale. This framework aims to be adopted in typical Italian historical centres, it can be shared with local authorities and territorial Civil Protection offices in order to plan prevention activities or emergency interventions.

Intermediate objective of the project is to develop an accurate numerical multiscale model for performing structural analysis of MUS most important buildings or building aggregates. This model can support SHM framework calibration, but it can represent, alone, an efficient tool for obtaining an accurate knowledge of buildings structural behaviour, for planning or suggesting strengthening interventions before seismic events and first-aid interventions during seismic sequences and plan specific emergency operations.

Another project objective is to obtain a deep and wide knowledge of historical centre, which is fundamental for developing the structural model and perform more accurate vulnerability analyses, but, more generally, it can increase the awareness of citizens and local authorities about their own built heritage.

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