

INDUSTRIAL APPLICATION

Computer-Aided Pre- and Post-Earthquake Assessment of Buildings Involving Database Compilation, GIS Visualization, and Mobile Data Transmission

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Abstract: *The aim of this article is to present a computer-aided comprehensive strategy for the rapid visual inspection of buildings and the optimal prioritization of strengthening and remedial actions that are necessary prior to, and after, a major earthquake event, respectively. Based on the visual screening procedures used in the United States and past experience in seismic assessment of buildings in Greece and Turkey (the two countries with the highest seismic risk in Europe), a building inventory is first compiled; then a vulnerability ranking procedure that is specifically tailored to the prevailing construction practice in Southeast Europe is implemented into a multi-functional, georeferenced computer tool, that accommodates the management, evaluation, processing and archiving of the data stock gathered during the pre- and post-earthquake assessment process, and the visualization of its spatial distribution. The methodology proposed and the computer system developed is then applied to the city of Düzce, Turkey, a city strongly damaged during the devastating 1999 earthquake.*

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1 BACKGROUND AND OBJECTIVES OF THE STUDY

As the socio-economic cost of a possible earthquake may be significant, a major effort has been made worldwide, mainly during the last two decades, toward the development of organized large-scale action schemes for the enhancement of the safety and serviceability of the building stock, the upgrade of the seismic performance of the infrastructure, as well as for the mitigation of potential environmental impacts and any other direct or indirect consequence.

This effort, which is primarily made in countries exposed to high seismic risk (due to high seismic hazard and/or high exposure caused by dramatic increase in the size of the urban habitat), is related not only to the pre- and post-earthquake disaster preparation and management methods to be employed, but also to the subsequent technical, social, administrative, legal, and financial measures necessary for the implementation of the foreseen schemes. A major component of the above strategic planning concerns buildings, whose performance is expected to affect considerably the overall