Quantitative assessment of socio-economic performance measures accounting for seismic damage to buildings and functional interaction with infrastructural systems at the urban scale

Francesco Cavalieri, Paolo Franchin, Pierre Gehl, Bijan Khazai

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F. Cavalieri & P. Franchin
Department of Structural Engineering & Geotechnics, University of Rome "La Sapienza", Via Gramsci 53, 00197, Rome, Italy

P. Gehl
Natural Risks and CO2 Storage Safety Division, BRGM, 3 avenue Claude-Guillemin, BP36009, 45060, Orléans, France

B. Khazai
Karlsruhe Institute of Technology, Center for Disaster Management and Risk Reduction (CEDIM), Hertzstr. 16, 76187, Karlsruhe, Germany

SUMMARY:
This paper presents a model to evaluate systemic performance metrics, such as casualties, fatalities and displaced population, that are of interest to emergency managers in planning response measures to an earthquake. These quantities are the necessary input to multi-criteria decision analysis models that estimate the impact on the regional health-care system and the shelter planning. The model is an integrated one, since the buildings damage state, the combined residual service level in the utility networks, as well as the weather conditions, all together play a role in the evaluation of the performance metrics. This novel feature is possible since the model is included within a larger analysis framework for the seismic vulnerability assessment of interconnected infrastructural systems, designed to account for interdependencies and for all relevant uncertainties, especially in terms of distributed seismic hazard and physical vulnerability of the systems. A simple application illustrates the model capabilities.

Keywords: displaced population, uncertainty, functional interdependence, SYNER-G