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The urban system of Crotone, Italy, facing the earthquake impact

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In the conventional evaluation of the earthquake impact, "physical" effects like structural or economic damage to buildings and number of casualties are estimated. The expected damage to lifelines is sometimes included in the analysis. However very rare are the analysis that provide an estimate of the cultural loss due to damage to the historical buildings and quite not-existent is the evaluation of the social impact of the seismic event due to social discomfort, loss of identity, job suspension, disruption of essential services, etc. Similarly, many other aspects, such as institutional disruption, alteration of external relationships, loss of efficiency in the rescue activities, more or less capability of the system to sustain the impact with internal or external resources, lifelines interactions, etc., may have a significant influence on the seismic impact and recovery. In other words the seismic performance of the urban system, considered as an ensemble of interacting sub systems that make the citizen normal live course possible, is seldom evaluated.

In the paper a methodology able to predict, with the help of a systemic approach, the status of the economic, social, cultural and political component of the urban centre in normal growth and in crisis period is proposed. This is essential in order to evaluate the ability of the city to fulfil its functions. The following main sub-systems are considered in the analysis: Social, Residential, Cultural, Road, Health, Education, Energy, Economic, Management, Emergency. Each one of the sub-systems includes many element at risk and is influenced by the remaining sub-systems. As an example, the Residential system (the buildings) affect the Road system because the collapsed buildings may block roads, and, in turn, the Road system affects the Emergency systems, since the Hospital may not be connected with the damaged buildings.

An application of the model is made with reference to Crotone municipality, South

Italy, where data on active faults, soil, buildings, infrastructures, lifelines, roads, population has been extensively collected in the past, within the PIC-Urban II project. Damage scenarios are performed for earthquakes with different return periods. Results are shown at different territorial scale: individual buildings, Istat census tracks and larger macro-areas. The functionality of several sub-systems are also evaluated. We believed that the proposed approach may be very useful both for the local civil protection and the urban planning management.