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## ESSENTIAL TOOLS TO MITIGATE VRANCEA STRONG EARTHQUAKES EFFECTS ON MOLDAVIAN URBAN ENVIRONMENT

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### Abstract

In a world of uncertainty, the only constant is change and rapid change produces a multitude of diverse facts. Risk is an integral part of life. While no country in the world is entirely safe, the lack of capacity to limit the impact of hazards remains a major burden for all countries and while the world has witnessed an exponential increase in human and material losses due to natural disasters, there is a need to reverse trends in vulnerability to earthquakes. Available data prove that natural disasters from earthquakes can cause considerable damages, with potentially severe effects to *urban environment*. Earthquakes cascade as chaotic chain reactions through the natural and *built environments*; therefore, seismic hazard and risk are time-dependent quantities. On the other hand, *environmental degradation* increases the intensity of natural disasters, and is often the factor that transforms natural hazards, into a disaster. In World, earthquakes are responsible for 15% of total number of events, and 30% of the total damages (Freeman, 2000). Last strong Vrancea earthquake on March 4, 1977 (Mw=7.4, h=95 km): 1578 dead and 11,321 injured, 36 ruined/destroyed blocks in Bucharest, 32,900 houses collapsed or severely damaged; 35,000 families homeless, tens of thousands (64,000) of buildings damaged from Iași and Bacău to Craiova, many other damages and destructions in the industry and economy; the downtown of Bacău was completely damaged etc. The goal of the paper is to enhance our capability to decrease the effects of strong and deep Vrancea earthquakes on urban and built environment, especially in Moldavian area. The *practical goal* is to enable new geo-technologies for reducing risk and improving community resilience. Specific fundamental and applied researches were developed last years by National Institute for Earth Physics sustained by national legislation and regulations as well as European Programs: FP-7, Cross-Border etc. The priority of protecting the environment is emphasized. This knowledge can be very fruitfully used by civil engineers in the design of new seismic resistant constructions and in the reinforcement of the existing built environment, and, therefore, supply a particularly powerful tool for the prevention aspects of Civil Defense.

*Key words:* early warning system, earthquake, urban environment

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