

Risk management in civil engineering

advanced course

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STRUCTURAL MEASURES

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Abstract

Action plans for seismic risk reduction are formulated within the open ended process of the Emergency Management Cycle. The four phases of the cycle include preparedness, response, recovery and mitigation. Preparedness is planning how to respond in case of emergency and working to increase the resources available to wage an effective response effort. Response is performed during and immediately following a disaster and is aimed to save lives, minimise property damage and facilitate the beginning of recovery from the incident. Recovery follows the response and continues until all systems return to normal, or near normal, conditions. Mitigation refers to activities which actually eliminate or reduce the chance of occurrence or the effects of a disaster.

The occurrence of an earthquake is so sudden and the impact on the victims so devastating that seismic risk can not be reduced relying only on preparedness, response and recovery. Public authorities in seismic-prone countries are typically responsible for protecting public safety and coordinating emergency response and reconstruction. Due to massive financial investments, to long term benefits and to the region or nation-wide social protection, public authorities are also responsible for assessing and mitigating public earthquake risk. In spite of this, resources are seldom allocated to implement policies and strategies for seismic risk mitigation, while, according to the do-nothing-until-it-happens approach, resources are used for peace-time necessities. This is the main reason why significant innovations and nation-wide action plans for seismic risk mitigation have usually been implemented after destructive earthquakes, when society is devastated and the risk highly perceived.

Several actions can be implemented at national or regional level to reduce the impact of future seismic events: bringing up-to-date the seismic zonation and the seismic codes, including the one for existing buildings, transfer of knowledge from Academy to professionals with the help of training courses, congress and other dissemination activities, seismic risk assessment of existing strategic and critical buildings and infrastructures, upgrade or retrofitting of residential private buildings and strategic public buildings and infrastructures.

The lecture will focus on the recent Italian and world-wide experiences on national and regional structural measures for risk mitigation and namely on strategies for the assessment and retrofit of private and public buildings and infrastructures, highlighting the difficulties encountered during the implementation of the programs. The large amount of investment required, the large number of object to be assessed, the imprecise knowledge of the built system on the territory, the prioritisation schemes and the funding allocation, the safety level to be achieved, the objectivity and homogeneity of the assessment and of the intervention design, and the controls on the assessment, design and works are the main issues that technicians and managers have to face when implementing such strategies.