



## **Vulnerability Assessment Methodologies for Generating Automatic Seismic Risk Scenarios**

J. Irizarry (1), X. Goula (1), T. Susagna (1), M. González (2), C. Martin (3), P. Delmotte (4), and B. Le Brun (5)

(1) Institut Cartogràfic de Catalunya, Spain, (2) Centre de Recerques en Ciències de la Terra, Andorra, (3) Geo-Ter International, France, (4) Centre Scientifique et Technique du Bâtiment, France, (5) Bureau de Recherches Géologiques et Minières, France

Located on the border between Spain and France, the Pyrenees region is one of the most active seismic zones of the two countries. Its historical seismicity and recent tectonics data indicate an important level of seismic hazard. Since 2004, the ISARD project: Information of Seismic Automatic Regional Damages has been studying both the seismic hazard and vulnerability within this region in order to develop a common scheme for generating seismic risk scenarios that surpasses the countries' borders and provide preventive and operational information on the seismic risk to the local first-aid and crisis management organizations. One of the main objectives of the ISARD project is to allow the fast diffusion to the crisis management and first-aid organizations of an informative note with real time earthquake information including an estimate of the damage that may be caused by the earthquake.

Three levels of vulnerability assessment are being considered within the ISARD project for damage estimation based on different levels of input data and methodologies. The vulnerability assessment for Level 0 is based on the classification of the building stock of a municipality according to the EMS-98 vulnerability classes according to the age, height and location of the building stock. The Level 0 damage estimation is calculated for each municipality within the region using the damage probability matrix methodology. The second vulnerability assessment level, or Level 1, implements the vulnerability index method. Each municipality is divided into polygons according to their structural typologies distribution among the building stock. The third and final vulnerability assessment level, namely Level 2, applies the capacity spectrum method to determine the expected damage level or damage probabilities

associated to a structure.

Right now, a real time system is functioning to send an SMS message informing of the localization and magnitude of the earthquake event. The development of the software for the Level 0 damage estimation is almost completed. With the purpose of demonstration, this automatic seismic information system will be later extended from the Pyrenees region to Andorra, and some provinces in Spain and France. Hopefully, this automatic seismic information system will contribute to enhance the management of the crisis caused by important earthquake events.