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THE DEVELOPMENT OF AN EDUCATIONAL SYSTEM FOR A LONG TERM TRAINING ON SEISMIC AND VOLCANIC RISK

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Abstract

One of the tasks of the European Project UPStrat-MAFA (Urban Prevention Strategies using MAcroseimic Fields and FAult Sources) is to develop an educational system aimed at long-term training, mainly on seismic hazard and risk. This task will be carried out by sharing the expertise of partners of the project to set different actions, encompassing programs and educational material for students, teachers and general public, and to design an interactive travelling educational path.

Starting from the Icelandic educational program tested on schools in the last decade by EERC (Earthquake Engineering Research Centre), the task will develop educational tools especially designed for children, and also new tools using the most spread information channels, in order to outreach information on seismic risk and how to cope with earthquakes.

The interactive travelling educational path on earthquakes and volcanoes, aimed at risk-reduction by increasing awareness, is an interactive experience using a multimedia approach, in order to have a very flexible, easy-to-share and appealing set of educational tools (video, simulations, games…) also developed for "edutainment". The educational path, which is also a travelling exhibition, has to deal with issues related to seismic and volcanoes hazard and risks, especially in urban areas.

The whole education-information system developed in the framework of UPStrat-MAFA project is structured to represent both a way to convey project results to the scientific community and to strengthen people's risk awareness and their training to face up to seismic and/or volcanic events.

UPStrat-MAFA: the 5 main activities with 10 related tasks

Forecast of damage scenarios
Task A : Data collection (instrumental, macroseismic fields … ect.)
Task B : Probabilistic Analysis of Macroseismic Data

Evaluation of the seismic hazard at site
Task C : Calibration of the input source parameters for simulation
Task D : Probability Hazard Assessment

Evaluation of the Risk
Task E : Assessment of vulnerability of buildings, infrastructures and system
Task F : Quantitative risk evaluation and mapping (i.e. Disruption Index)

Definition of prevention strategies
Task G : Disaster prevention strategies based on the level of risk
Task H : Disaster prevention strategies based on education information system

Activity of publicity & management
Task I : Publicity
Task J : Management of the project and report of the requirements to EC

Web site of the European project **UPStrat-MAFA**
http://upstrat-mafa.ov.ingv.it/UPStrat/

The main Actions of Task H

1. **Disaster prevention strategies based on an education information system is developed with comparative study of how the education information system is addressed in the different EU-countries participating in the project;**
2. **An interactive travelling educational path on earthquakes and volcanoes. A mobile earthquake interactive path is an action of disaster-risk reduction given by long-term activities based on an educational information system;**
3. **Development of educational materials and education using video realization (i.e. audio-video etc..)**

Components of public education

The EERC has had considerable cooperation with the village of Hveragerði, located 12 km west of the Centre. During an excavation for a new shopping centre in 2004, the contractors uncovered a surface fault running right through the building site; the building permit was subsequently lowered from a 3 storey to a single storey building. It was decided to clean up the fault and cover it with a transparent floor to allow people so see it (although a mat had to be placed on the floor as some people refused to walk over the transparent floor).

The EERC manages the Icelandic Strong-Motion Network, established in the mid-eighties, providing a nation-wide coverage of the most important seismic zones (Sigbjörnsson, 2004). In 2007, the Centre established a small-aperture strong-motion array in Hveragerði, the Ice-Array network, to record significant earthquakes in the region, establish quantitative estimates of the spatial variability of their strong ground motion, and shed light on earthquake source processes (Halldórsson et al., 2009).

Of the eleven monitors, the EERC placed one on either side of the fault and visible to those who peer down into the fault. The network measured Peak Ground Accelerations in Hveragerði from the range of 51% g to 101% g (Halldórsson and Sigbjörnsson, 2009). No catastrophic collapse of structures or physical injuries occurred in Hveragerði during the event, however the damage was extensive, (Sigbjörnsson et al., 2009) and many were visibly upset.

Figure 1: (from Thorvaldsdóttir et al., 2012) The caricatures Alvör and Alvar (left), (www.almannavarnir.is, 2000) and the duck-cover-hold sequence (right) depicted in a colouring book for children (www.almannavarnir.is, 2004).

In an attempt to catch the attention of the younger generation, the NCDI developed caricatures that young people could relate to. A professional designer was brought in for the task who suggested a young male character; however, the NCDI wanted both a male and female character. They were given names Alvar (the boy) and Alvör (the girl), which are acronyms derived from the word civil defense in Icelandic (Almannavarnir and Almannavörn). Their clothes are in the colours of civil defense: orange and blue. Alvar and Alvör are used to depict pictures of the duck-cover-hold sequence, which have been used in a colouring book (see Figure 1).

Mitigation and preparedness activities performed by home-makers (who are often also home-owners) greatly influence the amount of damage sustained by residential buildings and their content, and therefore also influence the response level required by authorities, volunteers and neighbors.

Figure 2: (from Thorvaldsdóttir et al., 2012) Top left: Entrance to the exhibition. Middle left: Badly damaged kitchen and a house that shakes. Bottom left: Monitor in front has pictures from locals and monitor in back has information from EERC. Stories on placards. Broken items in glass case. Right: Boy peering into surface fault. The yellow box is an ICEARRAY monitor.

The interactive educational path

The learning method is based on a "constructivist approach", which means that learners build or construct new ideas on top of their old ideas. In designing the educational interactive path, this approach has to take into account the knowledge of target visitor groups, particularly the knowledge of their distinctive learning styles and particular learning needs (Figure 3).

Figure 3: (from Nave et al., 2012)
An interactive travelling educational path on earthquakes and volcanoes)

The public education using video realization

Figure 4: Example of street interviews (from Nave et al., 2012)

One suitable tool for public education can be through videos. This tool is intended to reach the broader audience and hopingly the ones who are not aware of the risk at all, making use of internet opportunities.

Often it is not easy for general public to get correct information on natural hazards and risk mitigation actions, and people have little preparedness of what to do in case of an earthquake or other natural event.

The rate of general public preparedness could be tested by street-interviews, carried out asking people how they would react during an earthquake and volcanic event (figure 4).

The interviews will be supported by video material and images of natural disasters, in order to show the real impact that such these events could have on human life and to raise people's perception on seismic and volcanic risks. The following step will be to assess people's ideas of how safe they feel in their own home in case of earthquake and to draw their attention to simple preparedness and security measures..

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