

Task Group TG3

Seismic Risk and Earthquake Scenarios

Report of the Activities during the 1st term

1. Foreword

The mitigation of the effects is the primary objective of the research activities in the seismological and engineering fields concerning seismic problems. Notwithstanding the knowledge of earthquakes and seismicity and the ability of earthquake engineers have increased rapidly in the last decades, potential and actual losses are on the increase due to a growth of vulnerable communities.

Among others, finding a common language among researchers from different research fields and from different countries, to exchange data, to set up common mitigation programs derived from a multi-disciplinary approach is a very important, even if difficult, task.

For the above reasons, the main scopes of TG's and WG's of the EAEE are to find common viewpoint, harmonise procedures, improve databases, and establish states of the art. Even in Europe, where common cultural roots, similar characteristics of constructions and similar seismological features of the territory could make the exchanges easier and very fruitful, it is difficult to achieve these goals.

In order to reach these goals, during the period 94-98, TG3 organised 3 meetings and made a proposal to the European Union to fund its activities, whose name is ENSeRVES. Following there is a short report of the meetings of TG3/ENSeRVES.

2. Meeting of Wien (Austria), June 26-27, 1995

The organisation and scope of the new Task Group were discussed during a meeting held in Wien on June 26-27 1995. The participants at the meeting were: R.Flesch (President of EAEE) - Austria, A.Ansal (Secretary General of EAEE) - Turkey, M.Dolce (EAEE Co-Coordinator of TG3) - Italy, V.Schenk (ESC Co-Coordinator of TG3) - Czech Republic, M.Erdik (EAEE Co-Convener) - Turkey, P.Burton (ESC member) - United Kingdom, A.Kappos (EAEE member) - United Kingdom, K. Makropoulos (ESC member) - Greece, H.Sandi (EAEE member) - Romania, G.Zuccaro (EAEE member) - Italy.

Some important aspects relevant to vulnerability, hazard and earthquake scenario analysis procedures were discussed during the meeting. The following points were especially dealt with:

- a. The peculiarity of vulnerability assessment of historical centres,
- b. The need of considering all possible sources of information (damage data, mechanical model outputs, expertise, etc.) and of setting up suitable methods to combine all the available data,
- c. The usefulness of theoretical vulnerability analyses,
- d. The importance of detailing in R/C constructions, according to past earthquake experience,
- e. The need of establishing the scope of an earthquake scenario to select the earthquake characteristics,
- f. The importance of a good characterisation of the ground motion taking into account all the factors that affect it.

Regarding to organisational aspects, it was pointed out that the TG's have to be more flexible than the EAEE WG's, in order to create a link between subgroups or working groups that deal with single problems relevant to the same topic, which operate in a limited region or which belong to different organisations. This is the case of TG3, whose membership comes from EAEE and ESC (European Seismological Committee). It was discussed whether future activities of TG3 could regard original researches, coordination of on-going researches, or just

the organisation of meetings to exchange information, establish a common language, reach a consensus on procedures to evaluate hazard, vulnerability, risk and earthquake scenarios. In any case, TG3 should be supported with adequate funds, according to the type of activities that will be carried out.

3. ENSerVES Project

In order to finance and coordinate the research activities of the European Institutions working on earthquake engineering and seismological problems especially related to seismic risk, the coordinator of TG3 on the EAEE side, M. Dolce, in agreement with the coordinator of TG3 on the ESC side, V. Schenk, took the initiative of making a proposal to the European Commission within the INCO-COPERNICUS program. The proposal is named ENSerVES (European Network on Seismic Risk, Vulnerability and Earthquake Scenarios - ENSerVES) and involves 11 prominent Institutions working on Earthquake Engineering and Seismology from 10 EU and CCE countries (Italy, Greece, United Kingdom, France, Bulgaria, Romania, Albania, Czech Republic, Slovak Republic, Hungary). It has the same scopes as TG3 and common memberships. It therefore represents the first successful attempt got funding for three years activities of TG3. The proposal got an overall "very good" rate by the European Commission and has been funded with 230000 ECU.

The duration of the project is 3 years, starting from July 1997 and ending on July 2000. The research activities cover all the problems to be dealt with when performing seismic risk studies. These activities have to be carried out during joint general meeting (see the following table), joint research subgroups, exchanges, etc.

JM	Place	Time	Type of deliverable	Activities
1	Rome	23-24 January	Report	Essential coordination: agreement on detailing project aims, precise tasks, and logistic arrangements.
2	Padova	25-27 June	Report	Comparing the approaches used in the different Institutes to treat the same problems and starting preparation of a state of the art to be presented at the XI ECEE
3	Paris 11ECEE	7-11 Septem.	Intermediate Report with the state of the art	Comparing results and databases
4	Prague	March 1999	Report	Continuing comparing and integrating the results.
5	Tirana	Sept. 1999	Report	Programming the continuation of cooperation to draft guidelines, evaluate exploitation of results for Eurocode 8, subdividing tasks and organise subgroups for the final reports
6	Greece	May 2000	Final Report	Preparation of final reports and of guidelines

Up to now two meetings have been held. The first meeting was held in Rome (Italy), where the details of the project have been focalised and better defined. The second meeting was held in Padova (Italy), where approaches used in the different Institutes were compared, and the material to prepare the state of the art to be presented at the XI ECEE was collected.

3.1 Meeting of Rome (Italy), January 23-24, 1998

The 1st ENSerVES meeting was held in Rome on January 23rd and 24th. The Host Institution of this meeting was the National Seismic Agency (Servizio Sismico Nazionale, SSN) of the Department of the Technical Services of the Government (Dipartimento dei Servizi Tecnici della Presidenza del Consiglio dei Ministri), Rome, Italy.

The participants were as follows: Prof.M.Dolce and Dr.A.Masi (IT), RNDr.V.Schenk (CZ), Dr. H.Sandi (RO), Prof.P.Burton (GB) Prof.K. Makropoulos (GR), Dr. P.Y.Bard (FR), Dr.A.Kappos (GB), Dr. P. Labák (SK), Dr.E.Vasseva (BG), Dr.B. Muco and Dr.N.Pojani (AL), Dr.G.Szeidovitz and B. Zoltan (HU), Dr.F.Sabetta from SSN

participated at the meeting as representative of the host institution.

After a short description of the ENSeRVES network, its activity, duration and other information, a representative for each of the Institutions participating to ENSeRVES spoke about the activities in his Institution relevant to the ENSeRVES Project. The contents of these presentations are extensively described in the 1st Technical Report of the Project. The main objective of the meeting was the discussion of the different methodologies from each country, as the main goal to be obtained in the Project is to set up some guidelines (or at least some suggestions) about seismic risk evaluation and earthquake scenario procedures. The usefulness of considering the same case study to be analysed by each institution and the need of using the same vulnerability/damage survey procedures were discussed.

3.2 Meeting of Padova (Italy), June 26, 1998

The 2nd ENSeRVES Meeting was held in Padova on 26.6.98, in conjunction with the International Workshop on "Measures of Seismic Damage to Masonry Buildings".

The participants were as follows: Prof. M. Dolce - University of Basilicata - Italy, Prof. P. Burton - Anglia University - U.K., Prof. C. Davenport - Anglia University - U.K., Dr. H. Sandi - INCERC - Romania, Dr. V. Schenck - Academy of Science - Czech Republic, Dr. P. Labak - Academy of Science - Slovakia, Dr. G. Szeidovitz - Academy of Science - Hungaria. The invited participants were as follows: Dr. F. Papa - SSN - Italy, Dr. F. Sabetta - SSN - Italy, Prof. R. Spence - Cambridge University - U.K., Prof. C. Symakesis - Greece, Dr. G. Zuccaro - University of Naples - Italy.

Presentations of the scientific activities regarding hazard assessment carried out in their institutions were made by Szeidoitz, Labak, Sandi and Schenk. Problems of damage and vulnerability assessment were deeply discussed during the precedent Workshop on the Measure of Damage and will be reported in the relevant Proceedings.

After a short introduction on the scope, membership and programmed activities of the ENSeRVES Project and of the EAEE-TG3, a discussion was made in order to establish if it were possible to make a case study for earthquake scenarios and risk assessment within the Project, taking into account that funds are limited and especially devoted to travelling expenses. The final decision was that this is possible, conditioned upon the availability of data obtained from a specific project funded by other organisations. All the participants agreed that the "Potenza project", which is funded by Servizio Sismico Nazionale (SSN) and carried out jointly by the University of Basilicata (USB) and SSN, could fit all the requirements the case study should have.

The problem of harmonisation and standardisation of tools and procedures for vulnerability and damage assessment arose clearly during the meeting on the Measures of damage. At this regard, an effort should be made by ENSeRVES and EAEE-TG3 in order to set up a "European damage/vulnerability survey form", that could be used in every country. At the end of a long discussion it was decided that the following actions can be taken:

- Collecting all the information describing the main structural characteristics of dwelling buildings in as many countries as possible in Europe, so that it will be possible to compile a catalogue of the "European building types".
- Making observations and improvements of the Italian survey form, comparison with other available and already used forms, in order to establish a standardised European form.

Preliminary work plan for the 2nd term

The work-plan of EAEE-TG3 during the 2nd term is the natural continuation of the activities started during the 1st term, and are strictly associated to the activities to be carried out within the ENSeRVES project. The ENSeRVES Project (European Network on Seismic Risk, Vulnerability and Earthquake Scenarios) was proposed to the European Commission within the INCO-COPERNICUS program and funded with 230000 ECU. It involves 11 prominent Institutions working on Earthquake Engineering and Seismology from 10 EU and CCE countries (Italy, Greece, United Kingdom, France, Bulgaria, Romania, Albania, Czech Republic, Slovak Republic, Hungary). The duration of the project is 3 years, starting from July 1997 and finishing on July 2000. Therefore the last two years will cover the first two years of the 2nd term of TG3. During this period one or more new

research project will be proposed to the CE, according to the developments of ENSeRVES/TG3 activities.

These are the general objectives of ENSeRVES:

- Comparing seismic hazard assessment procedures used in the various countries, in particular for what concerns the single choices at the various steps, which are made when using standard procedures;
- Reaching consensus on some unified approach to seismic hazard assessment through standard procedures;
- Introducing new technologies which include regional tectonic structures and variable seismic wave attenuations, and by involving basic microzonation effects in order to define vulnerability effects of different local seismological conditions with respect to physical parameters of soils and rocks for the regional correction of the row values;
- Applying hazard values obtained for countries with a moderate/low seismic activity in national parts of EUROCODE 8, which has been developed for countries with high seismic activities;
- Creating a databank of relevant parameters for seismic hazard by establishing common criteria and formats;
- Comparing vulnerability and damage assessment procedures for residential buildings in the various countries;
- Improving and extending vulnerability assessment procedures for buildings through both the integration of different approaches (statistical, mechanical, expert-heuristic, etc.) and the integration of different data bases on damage from past earthquakes;
- Reaching consensus on some unified approach to vulnerability assessment with various levels of detail;
- Comparing procedures, when available, for vulnerability assessment of structures other than residential buildings, as for example industrial buildings, monumental buildings, bridges, etc;
- Comparing soil vulnerability assessment techniques;
- Comparing and developing methodological aspects of earthquake scenarios;
- Reaching consensus on the preparation of earthquake scenarios to investigate and quantify potential earthquake losses in segments of selected vulnerable cities;
- Examine problems of earthquake protection at urban scale, which relies on the philosophy of seismic hazard, vulnerability and risk analysis.

These activities will be carried out during joint general meeting, joint research subgroups, exchanges, etc. Up to now two ENSeRVES/TG3 meetings have been held. The first two meetings were held in Rome (Italy) on January 23-24, 1998, and in Padova (Italy) on June 26, 1998. According to the outcome of these meetings, the above objectives will be pursued by carrying two main activities:

- *making hazard and risk analyses relevant to the same case study (the city of Potenza in Italy),*
- *harmonising procedures for vulnerability analyses.*

The places, times, types of deliverable for ENSeRVES and the activities relevant to the next four planned meetings are reported in the following table.

Joint meeting	Place	Time	Type of deliverable	Activities
3	Paris XI ECEE	7-11 September	Intermediate Report with the state of the art	Comparing results and databases
4	Prague	March	Report	Continuing comparing and integrating the

		1999		results.
5	Tirana	September 1999	Report	Programming the continuation of cooperation to draft guidelines, evaluate exploitation of results for Eurocode 8, subdividing tasks and organise subgroups for the final reports
6	Greece	May 2000	Final Report	Preparation of final reports and of guidelines

The activities carried out at each joint meeting will be described in summary reports, which will be published in the Bulletin of the European Association for Earthquake Engineering. Two extensive reports will be prepared, in which the activities and the obtained results will be presented. The final report will contain the results obtained by ENSeRVES/TG3 and recommendations for seismic risk assessment procedures.

Mauro DOLCE

DiSGG, University of Basilicata, Potenza, ITALY