TIEMS, CODATA and Emercom of Russia joint workshop during the33 General Assembly of the European Seismological Commission

During 2011-2012, the TIEMS Regional Director Europe contributed to the organization of the joint workshop "Earthquake Loss Estimations in Emergency Mode" within the 33 General Assembly of European Seismological Commission (ESC) "Seismology without boundaries", 19-24 August, 2012 in Moscow, Russian Federation. The year 2012 is the 60th anniversary of ESC.

The main thematic areas of the ESC 2012 in Moscow were:
1. Structure of Earth's Interior.
2. Physics of Earthquakes and Related Fields.
3. Earthquake Forecasting and Prediction.
4. Seismicity Patterns: Natural and Induced.
5. Data Acquisition and Processing.
6. Artificial intelligence in geophysical data studies.
7. Non-instrumental Seismology.
8. Seismic Hazard, Time Dependent Hazard and Risk.
9. Recent Significant Earthquakes.
10. Seismology, Social Sciences, Education and Outreach.

The joint TIEMS, CODATA and Emercom of Russia workshop was organized within the eighth thematic area "Seismic Hazard, Time Dependent Hazard and Risk". The workshop was attended by scientists and experts in seismic risk assessment and management from different countries: China, Italy, France, Kirgizstan, Korea, Finland, UK, Greece, Germany, Haiti, Iran and Russia (program is attached).

As the experience of recent disasters in Japan, Chile, Haiti, China, Italy, Indonesia, Turkey and many others gave an evidence that authorities who are responsible for emergency response are lacking prompt and reliable information on the earthquake disaster, the special attention was given to the source of uncertainties in earthquake loss simulation in emergency mode and reliability of such estimations provided by different agencies.

It was stated that main constrains on accuracy/reliability of loss estimations in emergency mode come from:
- input data (event source parameters);
- free parameters in the models used for simulation (propagation/attenuation models, vulnerability/fragility functions, population impact models);
- data bases (cartographic and thematic, including inventory about elements at risk) used in loss computations.

The participants of the workshop agreed that an obvious way of improving the whole process of earthquake loss estimations in emergency mode is to confront the assessment output with the known consequences of previous events; *i.e.* data on impact of past earthquakes could help "calibrating" somehow the simulation models; furthermore, scenario earthquake approaches suffer from more or less badly-known parameters (inventory of objects-at-risk, vulnerability/fragility functions of buildings submitted to shaking, *etc*.): to a certain extent, these weaknesses can be partially mended through calibration procedure, in addition to improvement of available databases. In this respect, the information on physical and socio-economical consequences of past damaging earthquakes is very critical. At the

moment, data sets on impact of past earthquakes are not readily accessible to many potential users and can hardly be directly applied for comparison with simulated results because of lack the standard formats. In this respect coordinated and international efforts should be undertaken in order to solve the problem.

The questions of organization and provision of medical support have been discussed, as well as peculiarities of dynamics and structure of social loss during earthquakes with different intensity. It was mentioned that the main difficulties in scientific based logistic planning in the case of emergency due to strong earthquakes are dealt with specific peculiarities of each events, as well as with vulnerability of existing buildings stock and resources and manpower involved in medical response which result in different quantitative and qualitative characteristics of sanitary casualties (injuries). The participants noted the necessity of creation of unified classification of the earthquake - related injuries and medical registration system, which may contribute to collecting reliable information on injury structure and medico-evacuation pattern of the casualties.

During the workshop case studies about loss estimations systems in China, Russia, Kirgizstan, Germany which included description of procedures and data used for computations and results of loss computations for recent events in China, Turkey, Haiti and other countries, have been delivered and discussed. Special interest was raised by the presentation about the Chinese rapid assessment system for disaster situations (RASDIS) developed in Beijing Normal University and applied in the National Disaster Reduction Center of China as a part of the running centralized platform. The system was applied for the Yushu earthquake (M_s7.1) on April 14, 2010 loss estimation. The event resulted in collapsed buildings in Yushu County, Yushu Tibetan Autonomous Prefecture in Qinghai Province and caused tremendous damage in the urban areas of Gyêgu town, Qamdo, etc, with death about 3,000 people, injury about 12,000 people and damages of thousands of buildings.

In two months after the Haiti 12 January 2010 earthquake the Sismo-Haiti project, supported by the Technical University of Madrid, started as an answer to a required help by the Haiti government. The damage data obtained after the 2010 earthquake has been used to calibrate the validity of the capacity and fragility curves by choosing an appropriate ground motion relationship. Additionally, the influence of other ground motion relationships has been discussed and used for the scenario earthquake computation for the country. It was mentioned in the talk of Spanish and Haiti scientists that the seismic risk for Port-au-Prince remains high in most of the districts, showing very vulnerable areas. Therefore the local authorities have to drive their efforts towards the quality control of the new buildings, the reinforcement of the existing building stock, the establishment of seismic standards and the development of emergency planning also through the education of the population.

Another case study was presented about the ASSESS (Analysis of the Seismic ScEnarios of the School buildings for a definition of retrofitting priorities for Seismic risk reduction) project, aimed at knowing for preventive purposes the seismic risk of about 1,000 school buildings of the Friuli Venezia Giulia region (north-eastern Italy). During the project, the evaluation of people safety was approached with holistic and interdisciplinary methodologies, and with multi-level studies.

The procedure was reviewed about the forecast not only of the size of natural disaster but also of damage from disaster. The correlations between the loss value and the characteristics

of society should be used in such future estimations. This approach appears to be mostly requested in the cases of a shortage of data.

The efforts on creation of natural coseismic effect database delivered during the workshop had definite interest. Based on our IS, the database contains information on landslides and rock falls, liquefactions including buried forms called seismites, primary and secondary brittle deformations, hydrogeological anomalies, sinks, anomalous waves and other less significant effects, as well as instrumental earthquakes that occurred during 1950–2008 on area bordered by 42°–62°N and 80°–124°E. This territory covers north-east of Kazakstan, Mongolia and almost all southern sector of Siberia in Russia.

The attention was paid to seismic safety of critical facilities. The talk about the influence of negative exogenous processes on the integrated seismic risk level for the oil pipe line route in the South Eastern Siberia was considered.

The calibration and validation of earthquake catastrophe models for the insurance industry was discussed on the example of events in Algeria M6.8 2003 Boumerdes, M7.3 1980 El-Asnam and M7.3 1856 Djidjelli earthquake. It was shown that the validation process requires collaboration between Aon Benfield and its client in order to consider the insurance market penetration in Algeria. The proposed approach leads towards the production of an earthquake model for Algeria that is scientifically sound and reliable from one side and market and client oriented on the other side.

The paper has been submitted on the new EU Framework Programme for Research and Innovation "Horizon 2020". Horizon 2020 will focus resources on three distinct priorities:

- Excellent Science which focuses, in particular, on funding collaborative research to open up new and promising fields of research and innovation through support for Future and Emerging Technologies;
- Industrial Leadership which focuses on building of leadership in enabling and industrial technologies, with dedicated support for ICT, nanotechnologies, advanced materials, biotechnology, advanced manufacturing and processing, and space;
- Societal Challenges which focuses on funding for climate action and resource efficiency.

Nina Frolova
TIEMS Regional Director for Europe,
Convener of the workshop
Jean Bonnin,
Convener of the workshop
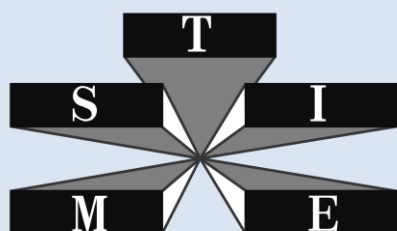
Annex 1

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Program of
"Earthquake Loss Estimations in Emergency Mode (SHR-9)"
<u>Joint workshop of TIEMS, CODATA and EMERCOM of Russia</u>
23 August 2012, Thursday

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Lecture hall	GREEN
Conveners	**J. Bonnin, N. Frolova, G. Qu, T. Marchenko, A. Samberg**
10:00-10:15	Reliability of Earthquake Loss Estimations in Emergency Mode (SHR9: O1) N.I. Frolova, J. Bonnin, V.I. Larionov, L.S. Chepkunas
10:15-10:30	China Earthquake Loss Rapid Estimations System: a Case of Ms7.1 Yushu Earthquake (SHR9: O2) L.X. Wu, Z. Wang, J.Q. Yu
10:30-10:45	Real-Time Forensic Disaster Analysis (SHR9: O3) F. Wenzel
10:45-11:00	Using 2010 Haiti Earthquake Data for Calibration of Future Seismic Risk Scenarios in Port-Au-Prince (Haiti) (SHR9: O4) S. Molina, Y. Torres, M. Navarro, D. Belizaire, B. Benito, J. Moise
11:00-11:15	Compilation and Preparation of Earthquake Scenario Based on Float and Scenario Fault Models by Fishnet Method, a Case Study, Gorgan City in Iran (SHR9: O5) A. Beitollahi, A. Nemati
11:15-11:30	Coffee Break
11:30-11:45	Earthquake Casualty Estimation in Emergency Mode: Structure and Dynamics of Losses (SHR9: O6) S.F. Goncharov, N.I. Frolova
11:45-12:00	The Importance of Calibration and Validation of Earthquake Catastrophe Models for the Insurance Industry (SHR9: O7) O. Gaspa Rebull, G. Trendafiloski, A. Podlaha
12:00-12:15	On Connection between Loss Values from Earthquakes and Social and Economic Situation: an Application to Damage Prognosis (SHR9: O8) M.V. Rodkin, M.X. Svarov, I.A. Moshchenko
12:15-12:30	Exposure and Vulnerability Estimation from Satellite and Ground-Based Remote Sensing for Seismic Risk Assessment in Bishkek, Kyrgyzstan (SHR9: O9)

	M. Wieland, M. Pittore, S. Tyagunov, S. Parolai, J. Zschau
12:30-12:45	Developing of Database on Coseismic Effects (SHR9: O10) O.V. Lunina, A.V. Andreev, A.A. Gladkov
12:45-13:00	Emergency Communications Modes in Disaster Scene: The-State-of-the-Art; Horizon 2020 - the New EU Framework Programme for Research and Innovation (SHR9: O11) A. Samberg

17:30-18:30	**POSTER SESSION-4: Thursday, 23 August 2012** SHR-9: Earthquake Loss Estimations in Emergency Mode		
Hall	**2nd Floor, under PLENARY Hall**		
SHR9: P001	ASSESS TO REDUCE THE RISK OF SCHOOL BUILDINGS AT REGIONAL LEVEL	D. Slejko, S. Grimaz, F. Cucchi, F. Barazza, S. Biolchi, E. Del Pin, R. Franceschinis, J. Garci, N. Gattesco, P. Malisan, A. Moretti, M. Pipan, S. Prizzon, A. Rebez, M. Santulin, L. Zini, F. Zorzini	58658
SHR9: P002	ROLE OF SEISMIC FACTORS IN ACTIVATION OF NATURAL, TECHNOLOGICAL, AND BIOSOCIAL CATASTROPHES	S. Bayda	58404
SHR9: P003	PREDICTING THE EFFECTS OF DESTRUCTIVE EARTHQUAKES IN VIEW OF REPEATED EXPOSURE TO SEISMIC LOADS, (additional from Emercom)	M.M. Dzybov, S.P. Sushchev, V.I. Larionov, N.I. Frolova, O.M. Saltykova, G.M. Nigmetov	62173
SHR9: P004	RELATIONSHIPS BETWEEN EARTHQUAKE PARAMETERS AND SPATIAL DISTRIBUTION OF ASSOCIATED LIQUEFACTIONS IN THE SOUTH OF SIBERIA AND MONGOLIA	A.V. Andreyev, O.V. Lunina	57934
SHR9: P005	MONITORING SLOPE INSTABILITY USING A COMBINED GPS AND INSAR APPROACH	G. Drakatos, D. Paradissis, D. Anastasiou, P. Elias, A. Marinou, K. Chousianitis, X.	57634

		Papanikolaou, E. Zacharis, P. Argyrakis, K. Papazissi, K. Makropoulos	
SHR9: P006	SEISMIC RISK AND MAJOR HAZARD INDUSTRIAL PLANT	M. Ciucci, A. Marino	57840
SHR9: P007	DEVELOPMENT AND ESTABLISHMENT OF AN INTEGRATED ALERT SYSTEM FOR PORTS TO COUNTERACT SEISMIC HAZARD AND SHARE SEISMIC DATA IN KOREA	C.G. Sun, B.S. Jeong, I.S. Lim, J.S. Lee	57359
SHR9: P008	EVALUATION OF GEODYNAMIC FACTORS IN THE FORMATION OF NEGATIVE EXOGENOUS PROCESSES ON THE OIL PIPELINE ROUTE	A.L. Dorozko, V.M. Makeev, D.O. Sergeev, J.V. Khalilova, A.N. Ugarov, S.P. Sushchev	60144