



GEM REQUEST FOR PROPOSAL: GLOBAL EXPOSURE DATABASE

Posting date: 18th January 2010
Submission deadline: 18th March 2010
Expected decision: July 2010
Target budget range: 900k Euros
Timescale: 36 months

PREAMBLE

Earthquakes have claimed millions of lives over the last century. Earthquake fatality rates are on the increase with growing population and urbanizations especially in developing countries. The poor earthquake performance of buildings is the main reason for these casualties. However, despite this fact, there are no comprehensive global building inventories of sufficient quality, resolution and coverage to adequately address, analyze and assess the potential for losses from future earthquakes.

The consortium working on this exposure inventory development component will create an open database of the global building stock distribution (and the associated uncertainties) that contains the spatial, structural, and occupancy-related information necessary for damage, loss and human casualty estimation models to be employed in GEM. The development of this database should be based on a well-documented systematic and flexible approach across the world. A suitable open data development environment needs to be created to allow for future modification and improvement of the database.

TASKS

Task 1. Exposure Data

Identify, evaluate and homogenize various existing databases (e.g. UN, international finance agencies, regional and other public organizations, governmental building census data, national statistics, global population databases such as GRUMP, LandScan etc., initiatives such as OpenStreetMap and Google Map Maker and published literature) that provide building stock distributions for countries, regions and cities throughout the world. The aim will be to collect such data for at least the first level of sub-national boundaries for all countries of the world. The consortium will also prepare a summary of these databases elaborating their strength and weakness, including comparison across the countries/regions to help identify the inventory gaps. The consortium should work with the Inventory Data Capture Tools consortium to identify, develop and/or recommend proxy procedures, built-up area recognition tools and image processing techniques for the identification of human settlements from satellite imagery.

Task 2. Global Exposure Database

Develop an inventory matrix for the global building stock, together with their uncertainties. The platform, software and other technical elements and standards required for this development, should be elaborated by the consortium. The resolution of the database should suit the risk assessment needs of GEM. For guidance, a 4x4km or preferably finer grid cell resolution is suggested. However the consortium can recommend other and geographically variable resolutions with appropriate and well-substantiated justification. Each grid cell should be geo-referenced with administrative divisions of the respective country or region. The consortium can propose to follow a step-wise approach in developing the inventory starting with a minimum solution encompassing only residential buildings with predominant construction types, and perhaps concentrating first on those regions of the world with the highest seismic hazard.

In coordination with the consortium on GEM Ontology and Taxonomy, each grid cell of the inventory should include the following attributes, together with an estimate of their uncertainty:

- a) Total number of buildings
- b) Total population
- c) Floor area of buildings

- d) Relative distribution of building types (building types include basic structural/constructive features (e.g. timber, masonry, R/C, steel) and performance-influencing features (e.g. number of storey classes, construction quality and year of construction classes depending on countries)
- e) Relative distribution of occupancy types (e.g. residential, industrial, public, commercial)
- f) Relative temporal distribution of the population (e.g. day- and night-time and transient) between building types and occupancy types
- g) Critical facilities with large loss potential and infrastructure needed for emergency relief

The consortium working on this global component is expected to obtain and present data in a uniform manner over the whole world and hence, as mentioned in Task 1, data for at least the first level of sub-national boundaries for all countries of the world is requested. However, other sources of data are likely to be available at higher levels of resolution in some areas of the world (for example population data are available from a number of sources on a 1km grid, and building-by-building data will be collected by the Inventory Data Capture Tools global component). The consortium should thus ensure that the developed platform/software is multi-scale with an interface that allows the user to move between multiple scales of detail and that the capability is provided to link up with the existing databases described in Task 1 as well as the data provided with the inventory data capture tools. The consortium is recommended to look into the integration of Spatial Data Infrastructures in order to provide, share, maintain and update inventory data.

Task 3. Recommend best practices

In coordination with the consortium on “Inventory Data Capture Tools”, identify best practices and develop recommendations for countries and/or regions such that the concerned organizations can efficiently improve and update their existing inventories.

PROJECT MANAGEMENT AND QUALITY ASSURANCE PLAN

The Project Management Plan should include:

- How linkages will be maintained with the consortia working on GEM Ontology and Taxonomy and on Inventory Data Capture Tools.
- An interaction and outreach plan for knowledge sharing with the Regional Programmes of GEM.
- A sustainability plan for future development/modification/improvement of the database.
- A program on training and capacity building for the GEM user community.
- A detailed account of how the bidding consortium ensures quality in its execution of contractual obligations.