

## GEM REQUEST FOR PROPOSAL: GEM ONTOLOGY AND TAXONOMY

Posting date: 18<sup>th</sup> January 2010  
Submission deadline: 18<sup>th</sup> March 2010  
Expected decision: July 2010  
Target budget range: 300k Euros  
Timescale: 36 months

### PREAMBLE

The Global Earthquake Model (GEM) aims to be the uniform, independent standard to calculate and communicate earthquake risk worldwide. Because earthquakes affect virtually all parts of society, GEM's model and its inputs/outputs are necessarily very broad and must develop in an evolutionary manner. However, even at the outset, some methodological foundation and terminology are needed in order to achieve a shared understanding across the disparate fields and endeavors encompassed by GEM. To fill this need, we are requesting the submission of proposals for the development of a sustainable GEM Ontology and Taxonomy (O&T), where:

- **Ontology** refers to the entire framework that will guide GEM's development – the set of concepts, and the relationship between those concepts that will allow determination and communication of earthquake risk. For GEM, the ontology might be structured around the risk calculation, symbolically (but not completely or accurately) captured in  $\text{Risk} = \text{Hazard} \times \text{Vulnerability} \times \text{Exposure}$ . This ontology must be elaborated in some detail.
- **Taxonomy** is a part of ontology, and refers to the classification of things in an ordered system, that reflects their relationship. For GEM to address global earthquake risk, a comprehensive taxonomy will be needed, that defines and orders hazard, asset, risk and consequence related parameters.

Every term and category that is used in GEM must be defined for (and by) its users, developers of its algorithms and databases, and its (internal) programmers and (external) co-developers. The taxonomy will never be completed, but an initial taxonomy can be developed, which is a task of this project. While no earthquake-specific ontology and/or taxonomy currently fully satisfies the needs of GEM, much work has been done which can be built upon as well as relevant work in the public health, computer sciences, insurance and other fields. Some knowledge of this work should be demonstrated in the proposal. Overall this project is envisioned as consisting of:

- (1) development of a GEM technical communications and coordination program;
- (2) development of a GEM Ontology;
- (3) development of an initial GEM Taxonomy, with provision for maintaining, sustaining and enhancing this Taxonomy into the future;
- (4) evaluation and testing of the proposed GEM O&T's applicability and utility for a broad spectrum of users ranging from the insurance industry to local planners in developing economies;
- (5) development of a program for promoting and disseminating the GEM Ontology and Taxonomy globally, with the aim that the GEM O&T will become a global seismic risk language and standard.

This shall be accomplished by the chosen consortium that will perform the following Tasks:

### TASKS

#### **Task 1: Development plan**

Propose a plan for involving GEM's various groups in the development of the GEM Ontology, and in the development and maintenance of the GEM Taxonomy. The proposal should consider the GEM organization and activities, and describe a technical communications and coordination plan that will usefully survive this project without significant future support from GEM.

### ***Task 2: Ontology***

GEM includes globally recognized experts in a number of specific fields. In this task, the consortium should develop a methodological foundation, or ontology, for GEM's activities as the basis for a shared understanding among these experts, and to facilitate GEM users and others in understanding and implementing the full scope of earthquake risk and the GEM initiative. It is noted that the development of GEM's ontology has already initiated through the definition of the hazard and risk global components, their interaction (as described for example in the background document that accompanies the risk RfPs), and the roadmap that is currently being developed for the socio-economic module of GEM. The bidding consortium is thus invited to study the "Building GEM" pages of the GEM website where such information is available. The Ontology construction process may involve contributions by the consortium but should result in the Ontology being the collective product of many GEM contributors, who should have intellectual investment in the Ontology. The GEM Ontology should be general and comprehensive enough to be long-lasting without frequent changes, but must adapt to future conditions so the consortium shall design and develop a modality for sustaining and enhancing the GEM Ontology.

### ***Task 3: Taxonomy***

Propose and implement development of a comprehensive working GEM Taxonomy (earthquake-related system of classification, set of terminology, encompassing hazard, risk and socio-economic realms). Use of existing established taxonomies is encouraged, but should not constrain development of the GEM taxonomy. Similar to Task 2, design and develop a modality for sustaining and enhancing the GEM Taxonomy.

### ***Task 4: Evaluation and Testing***

Propose an Evaluation and Testing (E&T) Plan for the GEM O&T, including criteria for evaluation, and at least three E&T Case Studies in communities representative of GEM participants and users.

### ***Task 5: Information Program***

Design and recommend a program for promoting and disseminating the GEM Ontology and Taxonomy globally. The program should reach out to users of varying background, from technically sophisticated to novices, using techniques such as media campaigns, training, tutorials, distance learning, reference and other materials, in a variety of media (including web-based) appropriate to the variety of users. The program shall have two parts: (a) an initial information program to be executed by the consortium during the final nine months of this global component and (b) a recommended plan for continued promotion and dissemination.

## **PROJECT MANAGEMENT AND QUALITY ASSURANCE PLAN**

The Proposal and Project Management Plan should:

- Explain how (a) a working draft O&T will be completed within approximately the project's first 6 months (ideally using and building on existing work in this field), for initial use by parallel Hazard, Risk and Socio-economic projects, and (b) the O&T project will continue on in collaboration with these parallel projects, building on their results.
- Explain how linkages will be maintained with all global components consortia.
- Present a team having an international perspective, with knowledge of earthquake hazard, risk and socio-economic phenomena and expertise in their analysis and mitigation.
- Utilize existing international initiatives in the seismic arena, to the extent possible.
- Include an interaction and outreach plan for knowledge sharing with the Regional Programmes of GEM.
- A detailed account of how the bidding consortium ensures quality in its execution of contractual obligations.