



Managing subjectivity & elicitations in the TSUMAPS-NEAM project

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The TSUMAPS-NEAM project (<http://www.tsumaps-neam.eu/>) produced the first region-wide long-term homogenous Probabilistic Tsunami Hazard Assessment (PTHA) map from earthquake sources for the coastlines of the North-East Atlantic, the Mediterranean, and connected Seas (NEAM) region. The hazard assessment was built upon state-of-the-art procedures and standards to pave the way toward long-term coastal planning.

When potential regulatory concerns are relatively high, the management of the technical controversies within a multiple-expert environment is critical for any hazard/risk assessment project. The procedure for the management of subjective choices and uncertainty quantification of TSUMAPS-NEAM is rooted in a formalized Multiple-Expert Integration protocol, developed in the framework of the European project STREST (2013-2016), dedicated to the design of a stress test methodology for non nuclear critical infrastructures in Europe (<http://www.strest-eu.org>). In a nutshell, the purpose of the multiple-expert uncertainty management protocol is: i) to establish roles and responsibilities, in order to guarantee transparency, independency of roles, accountability and achievement of procedural consensus; ii) to homogenize the management of decision making for subjective choices, guaranteeing documented and traceable decision making; iii) to establish homogeneous principles for the management of alternatives, that is, alternative and scientifically acceptable implementations for quantifying the community distribution.

The workflow of TSUMAPS-NEAM is composed of three main phases: Pre-assessment, Assessment, and Outreach. In these phases, different groups of experts interact to shape the project's development, within a pre-defined protocol. This protocol is based on a clear definition of roles and interaction among the different experts. This occurs in two ways: through structured information elicitations (literally meaning to draw out information), based on mathematical aggregation of opinions made by a pool of experts); and through a participatory independent review.

The roles of the different groups of experts are defined as follows: the Project Manager (PM), the Technical Integrator (TI), the Evaluation Team (ET), the Pool of Experts (PoE), and the Internal Reviewers (IR). All these actors should interact along the project to assure transparency and accountability of the different actors, while PM, TI, and IR should be independent to guarantee fairness of the results. Different roles and responsibilities are assigned to different actors. Each of these three PHASES is in turn composed of several stages, and the main actors play different roles, as represented in Figure 1.

Here, we present the general framework applied in TSUMAPS-NEAM, and we focus on the process that was adopted to develop and populate with weights the alternative tree for the quantification of the epistemic uncertainty, mainly based on the expert elicitation of the PoE based on Analytical Hierarchical Process.