SHEER WP7 six months Report, 30.04.2016
(A. Garcia, WP7 Leader)

Short summary of the progresses of the period

Please provide a concise overview of the progress of the work in line with the structure of Annex I to the Grant Agreement (DoA)

- **List of the staff actively involved in the WP**
  There are three project partners involved in the activities of the WP7 (AMRA, KeU, KNI). The staff involved by parter are:
  - Alexander Garcia-Aristizabal, WP leader, AMRA (Italy).
  - Raffaella Russo, AMRA (Italy)
  - Simona Esposito, AMRA (Italy)
  - Nigel Cassidy, KeU (UK)
  - Bernard Dost, KNMI (Netherlands)

- **Objectives expected after 6 Month**
  The activities of the WP7 can be articulated in the following four objectives: (1) to implement an effective mechanism to identify and structure scenarios of risk interactions and cascading effects in each phase of development of a project; (2) to develop and implement physically-based probabilistic tools for the harmonious assessment of the likelihood of occurrence of inter-related risk scenarios considering the induced seismicity, ground water pollution, air pollution, technological and NaTech-like accidents; (3) to implement the developed framework in one of the test of the project; and (4) to perform a comparative analysis between the impacts of shale gas operations and the impacts related to exploitation of alternative energy sources. During the second semester of the first year, the activities of this WP have been concentrated in the first two objectives, namely, the identification of scenarios and the development of probabilistic tools for scenario quantification.

- **A summary of progress towards objectives and details for each task in the first six months**
  As stated before, during this semester the activities pointed towards the identification of scenarios for the multi-risk model and to implement the probabilistic framework for quantitative assessments. The first deliverable of this WP was due in M12 after the start of the project (April 2016), and it was successfully submitted. Therefore, the state of advancement is on time respect to the scheduled activities. The activities regarding the implementation of the framework for quantitative assessments have already been started and are at the moment under development.

  <u>Details by task</u>:

Task 7.1:
This task was in charge of producing the deliverable D7.1: "Framework for holistic multi-risk assessment of shale gas operations: (1) Methods for identifying and structuring scenarios". This activity was based on a deep review of specialized literature regarding the impacts of shale gas operations. In this process, 37 peer-reviewed papers, 4 peer-reviewed reports, and 9 non peer-reviewed reports were analyzed and used to outline the most important risk pathways claimed as of major importance regarding the shale gas operations. The selected risk pathways have been structured defining causal relationships among events. This review has also considered the identification of indicators for assessing socio-economic impacts associates with shale gas development. The outcome of the main activities in this task are at the moment feeding the production of a review paper.

Task 7.2:
This task is in charge of developing the probabilistic framework for quantitative assessment. AMRA has worked in the logical structure of the multi-risk framework, which is based on the implementation of a "bow-tie" approach, have been identified as the most efficient way to face this problem. The process of translating the causal relationships identified by T7.1 in the form of fault-trees/event-trees required for the bow-tie already started. Finally, a procedure based on Bayesian data analysis is being explored as the mechanism for quantitative assessment.
Regarding specific physically-based tools for feeding the multi-risk framework, KeU is implementing random models of hydrofracking processes (in Fracman) to assess the range of fracture length, area and density under a practical range of operational parameters (e.g., pumping pressures, etc). These will provide the base data to assess the likelihood and risk of problematic events under the risk framework.

Task 7.3:
No yet started. The activities in this task are dependent of the output of the other two tasks of the WP.

- **Highlight clearly significant results;**
  A set of scenarios for different phases of a project development were identified using as reference specialized literature. More than 50 risk pathways were identified, and causal relationships were defined.

- **If applicable, explain the reasons for major deviations from Annex I and their impact on other tasks;**
  Not applicable.

- **If applicable, explain the reasons for failing to achieve critical objectives and/or not being on schedule and explain the impact on other tasks as well as on available resources and planning;**
  Not applicable.

- **If applicable, propose corrective actions.**
  Not applicable.

- Publications and papers in print
  None.

Deliverables due at the date

Please complete this table if deliverables are due for the reporting period

Table 1. Deliverables due at the date

Del. no.	Deliverable name	Version	WP no.	Lead beneficiary	Nature	Dissemination level[1]	Delivery date from Annex I (proj month)	Actual / Forecast delivery date Dd/mm/yyyy	Status No submitted/ Submitted	Contractual Yes/No	Comments
D7.1	Framework for holistic multi-risk assessment of shale gas operations: (1) Methods for identifying and structuring scenarios	Final	7	AMRA	Report	PU	M12	M13	Submitted		

[1] **PU** Public
PP Restricted to other programme participants (including the Commission Services)
RE Restricted to a group specified by the consortium (including the Commission Services)
CO Confidential, only for members of the consortium (including the Commission Services)

Milestones in the reporting period

Please complete this table if milestones are specified for the reporting period

None.

TABLE 2. MILESTONES IN THE REPORTING PERIOD							
Milestone no.	**Milestone name**	**Work package no**	**Lead beneficiary**	**Delivery date from Annex I dd/mm/yyyy**	**Achieved Yes/No**	**Actual / Forecast achievement date dd/mm/yyyy**	**Comments**