

KEM Innovation/Research Question (max. 4 pages + annex)

TITLE *Public seismic hazard and risk model Groningen version 6*

Objective

In 2019, a public version of the Groningen seismic hazard and risk model (TNO HRA model) was delivered. This version is functionally a 1:1 replication of the NAM HRA version 5, including all assumptions and choices made, and is able to reproduce the outcome of the NAM HRA, while performing faster due to a slightly different statistical approach.

For the hazard and risk assessment of 2020 NAM uses updated models for the hazard and risk calculation. For the seismological model version 6, for the ground motion model version 6 en for the damage module version 7 (version 6 was applied in 2019).

As the model chain of TNO should be used in calculations of hazard and risk, the models need to be updated to the latest models that are being used.

State of the art, background

In 2019, a public version of the Groningen seismic hazard and risk model (TNO HRA model) was delivered. This version is a 1:1 replication of the NAM HRA version 5, including all assumptions and choices made, and is able to reproduce the outcome of the NAM HRA.

The public version of the Groningen hazard and risk model should be updated to the versions of the models used by NAM for the hazard and risk assessment of 2020. This means the implementation of seismological model V6, ground motion model V6 and damage model V7.

The planned ground motion version 6 model of NAM includes corrections in the seismological calibrating data and various changes in the GMPE, some of them corresponding to suggestions made in some of the KEM projects.

Some KEM work (KEM-04 and KEM-02 projects) provided a series of hints and pointed on some possible issues in the NAM HRA. This RQ should also address the effect on HRA on the potential bias in the NAM HRA.

Research Questions

Specific research questions are:

- 1. What is the effect of the new updated models on hazard and risk assessment in Groningen?**
- 2. Is the hazard and risk calculated with the updated public model of TNO comparable to the NAM results? And if not, how can the differences be explained?**
- 3. Which improvements (as recommended by NAM or various KEM projects) should to be included in a next version of the TNO HRA model?**
- 4. What is the effect of the outcomes of KEM-04/02 on the hazard and risk assessment?**

Deliverables expected

1. Realisation of a 2020 version of the TNO HRA model, which is comparable and can be validated to the newest NAM HRA model.

- Implemented to V6 (ground motion model)/V7 (damage model) and open access version of the instrument (data and software), including test and validation reports.
- Reference prediction of hazard and risk which can be compared to NAM HRA 2020
- Recommendations for improvements (functionally, technically, performance, access, etc.).

2. A report outlining the changes in 2020 with respect to the V5 model chain and recommendations for a next version of the TNO HRA model.

Timeline

Midterm progress presentation at the KEM meeting in June 2020.
Second deliverable is the Groningen seismicity model by end of 2020 and a final report.

Expected use

EZK and SodM will use the results in their responsibility concerning owner of safety instruments for the Mining Law.
They will use it to validate NAM models and to investigate risk profiles of different gas production scenarios.

The instrument will be made available to universities, research institutes and companies upon request.

Expertise and tools preferred for the team

This task is best performed by the experts of the TNO HRA model, with different backgrounds (computation, QA, risk modelling, societal aspects.), and with access to the relevant players at NAM, EZK, SodM and KEM project leaders.

Quality assurance, Organisational and communication requirements

Multidisciplinary team is required covering the different modules.
For the implementation it is important to have regular progress meetings with the client EZK/SodM and also with the KEM-panel.

Remarks and Suggestions

Maximum 200 characters (Extra information concerning the Innovation/Research question)

References

NAM portal
- Main literature related to the Groningen seismicity risk model, up to 2020. NAM reports.

Selection ranking criteria (only for KEM expert panel only). Scale: 1(no) - 5(yes) and short comment

	Considerations	PE 1	PE 2	PE3	PE4	PE5
Scientific	State of the art OK?					
	Valid I/R question?					
	Realistic expectation?					
	Categorisation OK?					
	Scientific publishable?					
	RA Tool improvement?					
....						
Feasibility	Deliverables?					
	Deadlines?					
	Budget allocated?					

	Openness?						
	...						
						
Building trust	Concerns addressed?						
	Risk reduction focus?						
	Quality assured?						
	Communication OK?						
	Reputation team OK?						
	Open products?						
						
Total (weighted) score							

Suggestions of experts and/or research entities

PE	Organisation name	Names of experts
PE 1	TNO	Sander Osinga, etc.
PE 2		
PE 3		
PE 4		
PE 5		