The Societal Role of Scientists in Induced Seismicity

Lessons Learned from Groningen (The Netherlands)

Manuel Sintubin
KU Leuven
Belgium
“Le parole hanno un peso”
M. Van der Sluis:
“It is evident that the gas extraction and the earthquake are related, and that more earthquakes can most probably be expected.”

Spokesperson of NAM:
“We do not react to such balony.”
“We definitively relegate this to the realm of fairy tales.”
The Groningen gas field – gas production & seismicity

Sintubin 2018
The “Ommelanden” of Groningen
“Disaster in slow motion”
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“Disaster in slow motion”
“Disaster in slow motion”
WICKED PROBLEM

The Wicked Problem of Earthquake Hazard … (EOS, Stein et al. 2018)

“Disaster in slow motion”
“In the case of earthquakes in Groningen, a small ‘regular’ crisis triggered a large ‘institutional’ crisis.”

Schmidt et al 2018
Science outreach failure

SCIENCE VS. EVERYTHING ELSE

ANSWERS

SIMPLE BUT WRONG

COMPLEX BUT RIGHT
Onderzoeksrapporten

Hier vindt u de resultaten van onderzoeken die gedaan worden door NAM. Houd deze pagina regelmatig in de gaten voor updates.
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RISK MESSAGE MODEL

scientist -> science communication -> citizen (public)

expert-led research

matters of FACT

"deficit gap"

"neutral mediator of knowledge"
RISK MESSAGE MODEL

ACADEMIC SCIENCE

- matters of FACT
- "authority"
- "trust"
- "honesty"
- "embracing uncertainties"

alternatives to: the public

media

ALTERNATIVE SCIENCE

- matters of CONCERN
- "cherry picking"
- "distrust"
- "politically polarized"
- "false certainties"

would-be scientist

scientist

activist

politician

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SOCIALY-CONSTRUCTED PERCEIVED RISK (Sander 1993)

RISK = HAZARD * VULNERABILITY
SOCIALY-CONSTRUCTED PERCEIVED RISK (Sander 1993)

RISK = HAZARD * OUTRAGE

- Outrage Management: people excessively concerned about a small hazard
- Crisis Communication: people are rightly concerned about a genuine threat

Primary components of outrage:
- Industrial
- Coerced
- Exotic
- Memorable
- Dreaded
- Catastrophic
- Unknowable
- Controlled by others
- Unfair

Outrage = the extent that people are upset, frightened or angry

Precautionary Advocacy: grabbing the attention of an uninterested audience to arouse proper concern and motivate precaution-taking

HAZARD = the objective, technical aspect of the risk (probability, damage extent)

Stewart & Lewis 2017 (after Sander 1993)
SOCIAL-CONSTRUCTED PERCEIVED RISK (Sander 1993)

RISK = HAZARD * OUTRAGE

EXPERTS focus on hazard and ignore outrage
- overestimate ‘social risk’ when hazard is high and outrage is low
- underestimate ‘social risk’ when hazard is low and outrage is high

PUBLIC focuses on outrage and ignore hazard
- overestimate ‘social risk’ when hazard is low and outrage is high
- underestimate ‘social risk’ when hazard is high and outrage is low

RISK CONTROVERSY (Sander 1993)

“If people are outraged because they overestimate the hazard, the hazard needs to be explained!”
“If people overestimate the ‘social risk’ because they are outraged, the factors leading to the outrage need to be tackled!”
RISK PERCEPTION PARADOX (Wachinger et al. 2013)

Welkom op aardbevingenwijzer!
Bekijk hier weetjes over aardbevingen in Groningen

Wijzer worden over wat je doet bij aardbevingen?
RISK PERCEPTION PARADOX (Wachinger et al. 2013)

- scientist
  - higher earthquake awareness
- citizen (public)
  - higher mitigation action

Science outreach failure
RISK PERCEPTION PARADOX (Wachinger et al. 2013)

“values and beliefs”
“identity affirmation”
“endemic unpreparedness”
“emotional distance”
“fatalism vs optimistic bias”

“What a geologists wants to tell is not what the community wants to hear!”
• The scientific community was **not prepared** when the 2012 Huizinge earthquake took everyone by surprise!

• The scientific community was initially **not interested** in the Groningen case!

• Science has been completely **expert-led**, focussing on technical and physical aspects of the induced seismicity!

• Science communication has been a **one-way transfer** of scientific information!
REACTIONS TO THE LATEST HIGGS BOSON ANNOUNCEMENT...

SCIENTISTS

MAYBE WE WILL BEGIN TO UNDERSTAND HOW MATTER HOLDS TOGETHER!

THE PUBLIC

GOSH, I WONDER WHAT KIM KARDASHIAN IS DOING RIGHT NOW.
Lessons learned

RISK MESSAGE MODEL

scientist

expert-led research

matters of FACT

science communication

“deficit gap”

citizen (public)

“neutral mediator of knowledge”

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Lessons learned

RISK DIALOGUE MODEL

scientist

expert-led research

matters of FACT

“honest broker”

science communication

citizen (public)

community-led research

matters of CONCERN

PUBLIC SCIENCE

PUBLIC

science (public)
WHAT IS THE SOCIETAL ROLE OF SCIENTISTS IN INDUCED SEISMICITY?

- The communication as a scientist should always be evidence-based!
- A scientist is serving society!
- As a honest broker a scientist tries to integrate societal concerns and scientific facts to open up a range of options to public and policy makers!
- A scientist doesn’t make choices; people make choices; politicians make decisions .... the scientist’s job is to empower them to make informed choices and decisions!
- There is NO one-size-fits-all scenario for (induced) earthquake risk communication!
“As well as having to learn how to ‘speak better’, geoscience communicators are going to have to learn to ‘listen better’!”

Iain Stewart & Deirdre Lewis 2017