

Lecturing ethics in nuclear science and technology and radiation protection courses:

Motivations, approaches and attention points.

Gaston Meskens

*Science & Technology Studies Unit, SCK•CEN (Belgium)*

*Centre for Ethics and Value Inquiry, University of Ghent (Belgium)*

[gaston.meskens@sckcen.be](mailto:gaston.meskens@sckcen.be)

*ETRAP2017*

*Valencia, 1 June 2017*

Lecturing ethics in nuclear science and technology and radiation protection courses: [Motivations, approaches and attention points](#).

- For more than a decade now, the SCK•CEN Academy for Nuclear Science and Technology, in cooperation with the Science & Technology Studies unit of SCK•CEN, organises 'Seminars on Ethics, Science & Technology', either in the form of self-standing events or as part of nuclear science and technology and radiation protection courses.

Target audiences include science and engineering students and professionals working in the nuclear field, and seminar formats vary from short presentations to interactive workshops running over several days.

- See the full paper written for this conference on the ETRAP2017 website
- This presentation:
  - Key ideas related to ethics, science & technology treated in the courses.
  - Approach and learning outcomes

key **1** idea

Risk and the importance of self-determination (as a principle of justice)

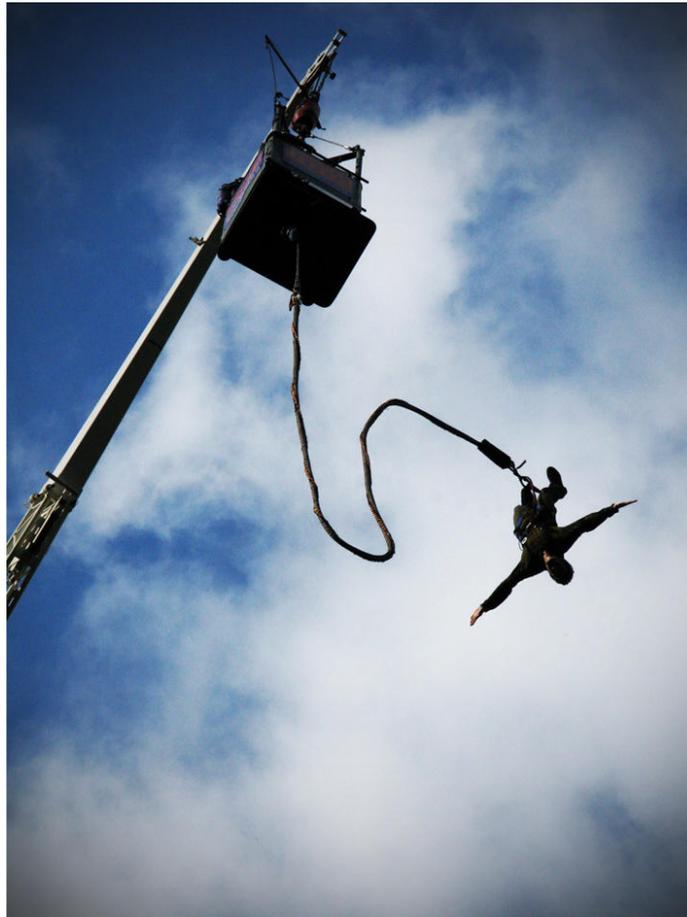
# 1

Risk and the importance of self-determination (as a principle of justice)  
What is an 'acceptable risk'?

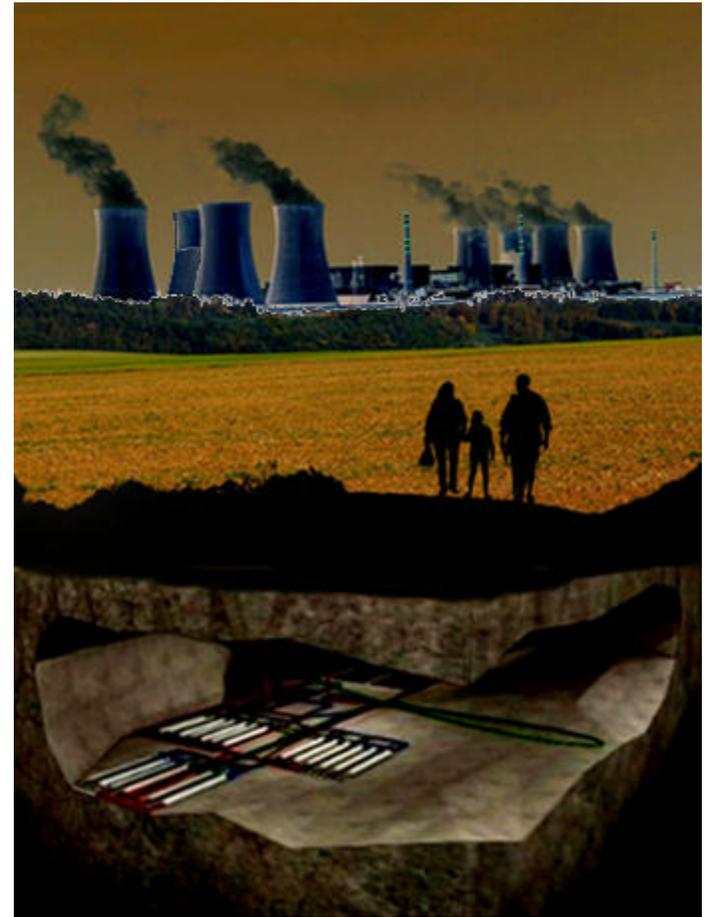
# 1

Risk and the importance of self-determination (as a principle of justice)  
What is an 'acceptable risk'?

do we need **calculation**  
to support **informed consent**?



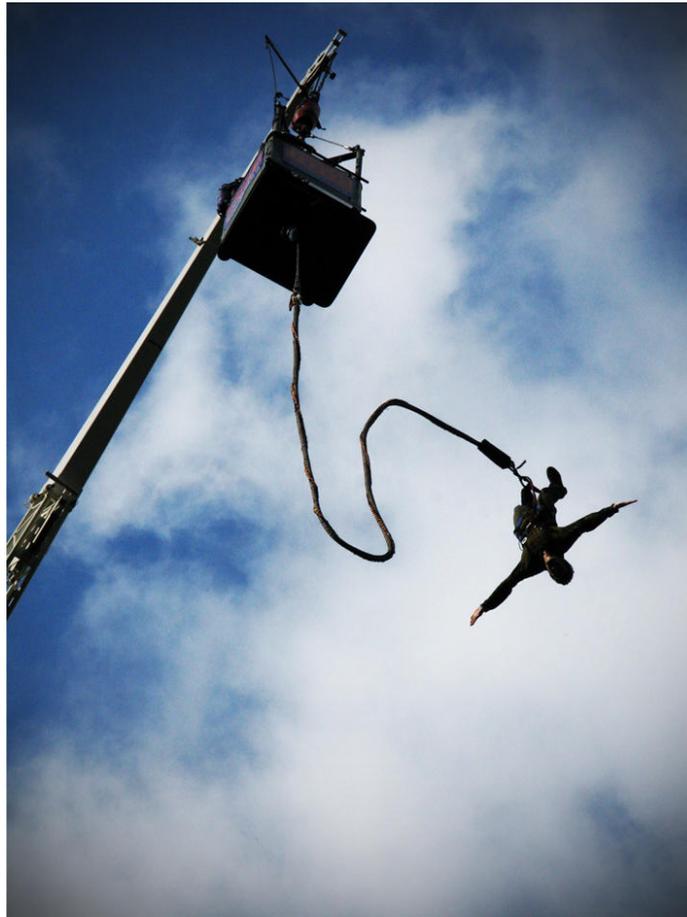
do we need **informed consent**  
to support **calculation**?



# 1

Risk and the importance of self-determination (as a principle of justice)  
What is an 'acceptable risk'?

do we need **calculation**  
to support **informed consent**?



do we need **informed consent**  
to support **calculation**?



# 1

## Risk and the importance of self-determination (as a principle of justice) What is an 'acceptable risk'?

- A risk is not a mathematical formula; it is a potential harm that
  - you cannot completely know and
  - you cannot fully control
- Acceptable risk?  
People will accept a risk they cannot completely know and that they cannot fully control simply when they **trust** that its justification is **marked by fairness**.

# 1

## Risk and the importance of self-determination (as a principle of justice) What is an 'acceptable risk'?

- A risk is not a mathematical formula; it is a potential harm that
  - you cannot completely know and
  - you cannot fully control
- Acceptable risk?  
People will accept a risk they cannot completely know and that they cannot fully control simply when they **trust** that its justification is **marked by fairness**.

Fairness: the **possibility of self-determination** ensured by 'the right to be responsible'

risk for  
society

the right to co-decide  
↑

**the right to be responsible**

risk taken by  
an individual

↓  
the freedom to hurt yourself



# 1

## Risk and the importance of self-determination (as a principle of justice) What is an 'acceptable risk'?

- A risk is not a mathematical formula; it is a potential harm that
  - you cannot completely know and
  - you cannot fully control
- Acceptable risk?  
People will accept a risk they cannot completely know and that they cannot fully control simply when they **trust** that its justification is **marked by fairness**.

Fairness: the **possibility of self-determination** ensured by 'the right to be responsible'

risk for society

the right to co-decide  
↑

**the right to be responsible**

risk taken by an individual

↓  
the freedom to hurt yourself



- For any health risk that comes with technological, industrial or medical practices and that has a wider impact on society, 'the right to be responsible' equals 'the right to co-decide'. **Enabling this right is a principle of justice**

key 2 idea

Societal trust around risk needs to be generated 'by method instead of proof'

# 2

## Societal trust around risk needs to be generated 'by method instead of proof' Understanding uncertainty and value pluralism

- No scientific or political authority can determine alone what would be an acceptable risk for society.
- In dealing with the radiation risk, good science and engineering, open and transparent communication and the 'promises' of a responsible safety and security culture are necessary conditions but can never generate societal trust in themselves.
- ↘ The reason is that there will always be essential factors beyond full control: nature, time, human error, misuse of technology, which implies that one always has to deal with **uncertainty due to incomplete and speculative knowledge** and **value pluralism**.

### **value pluralism** or **moral pluralism**:

Even if we would all agree on the scientific knowledge base for the assessment of the risk, opinions could still differ on its acceptability. Science may thus inform us about the technical and societal aspects of options, it cannot instruct or clarify the choice to make.

- Trust by method: transparency, possibility of participation and deliberation, recognition of uncertainty and value pluralism.

# 2

Societal trust around risk needs to be generated 'by method instead of proof'  
Seeking societal trust: the challenge for science

# 2

Societal trust around risk needs to be generated 'by method instead of proof'  
Seeking societal trust: the challenge for science

---

- Confronted with the need to deal with incomplete and speculative knowledge and value pluralism in providing policy advice on issues of social well-being, **the challenge of science** is not the production of credible proofs, it **is the construction of credible hypotheses.**

# 2

## Societal trust around risk needs to be generated 'by method instead of proof' Seeking societal trust: the challenge for science

- Confronted with the need to deal with incomplete and speculative knowledge and value pluralism in providing policy advice on issues of social well-being, **the challenge of science** is not the production of credible proofs, it **is the construction of credible hypotheses.**



key **3** idea

Ethics as a care for our human relationships

# 3

Ethics as a care for our human relationships  
The social problems we face today are ultimately complex



# 3

Ethics as a care for our human relationships  
The social problems we face today are ultimately complex



Taking this complexity serious, the idea is that the traditional methods of international politics, representative democracy, the market and science are not longer able to grasp the complexity of these social problems.

# 3

Ethics as a care for our human relationships

The fact of complexity leads to 3 new characteristics of modern co-existence

**connectedness**

**vulnerability**

**(sense for)  
commitment**

# 3

## Ethics as a care for our human relationships

The fact of complexity leads to 3 new characteristics of modern co-existence

### connectedness

We are connected with each other 'in complexity'. We cannot any longer escape or avoid it. Fair dealing with each other implies a fair dealing with the complexity that binds us.

### vulnerability

In complexity, we became intellectually dependent on each other while we face our own and each other's 'authority problem'. We should care for the vulnerability of the ignorant and the confused, but also of 'mandated power'.

### (sense for) commitment

Our experiences now extend from the local to the global. As intelligent reflective beings, to become involved in deliberating issues of general societal concern became a new source of meaning and moral motivation.

# 3

Ethics as a care for our human relationships

The fact of complexity leads to 3 new characteristics of modern co-existence

**connectedness**

**vulnerability**

**(sense for)  
commitment**



# 3

Ethics as a care for our human relationships

The fact of complexity leads to 3 new characteristics of modern co-existence

connectedness

vulnerability

(sense for)  
commitment

Bangladesh



# 3

Ethics as a care for our human relationships

The fact of complexity leads to 3 new characteristics of modern co-existence

connectedness

vulnerability

(sense for)  
commitment

Bangladesh



China



# 3

Ethics as a care for our human relationships

The fact of complexity leads to 3 new characteristics of modern co-existence

connectedness

vulnerability

(sense for)  
commitment

Bangladesh



China



# 3

Ethics as a care for our human relationships

The fact of complexity implies reflexivity of everyone concerned

→ **reflexivity** as an **ethical attitude** or **virtue**  
with respect to the own position, interests, hopes, hypotheses, believes and concerns, and this in any formal role or social position (as scientist, engineer, RP officer, politician, manager, citizen, civil society representative, activist, ...).

# 3

Ethics as a care for our human relationships  
The fact of complexity implies reflexivity of everyone concerned

→ **reflexivity** as an **ethical attitude** or **virtue**  
with respect to the own position, interests, hopes, hypotheses, believes and concerns, and this in any formal role or social position (as scientist, engineer, RP officer, politician, manager, citizen, civil society representative, activist, ...).

Adopting this attitude requires **reflexivity** as an **intellectual skill**

**seeing the bigger picture and yourself in it**

with your interests, hopes, hypotheses, believes and concerns

# 3

Ethics as a care for our human relationships  
The fact of complexity implies reflexivity of everyone concerned

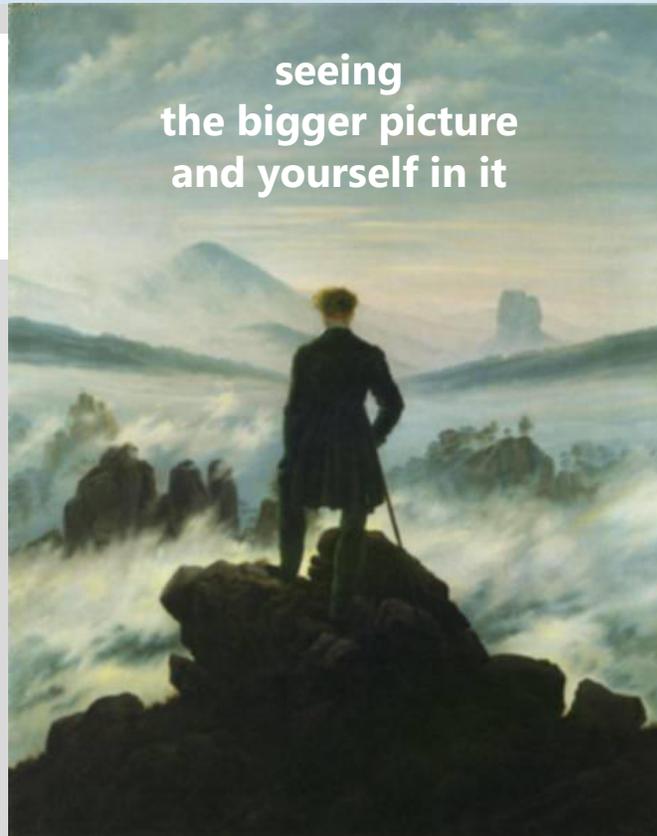
→ **reflexivity** as an **ethical attitude** or **virtue**  
with respect to the own position, interests, hopes, hypotheses, believes and concerns, and this in any formal role or social position (as scientist, engineer, RP officer, politician, manager, citizen, civil society representative, activist, ...).

Adopting this attitude requires **reflexivity** as an **intellectual skill**

seeing  
the bigger picture  
and yourself in it

with your interests, hopes, hypotheses, believes and concerns

Caspar David Friedrich  
"Wanderer above the Sea of Fog"  
1818



## Conclusion

### Seminars on Ethics, Science & Technology Approach and learning outcomes

- Approach
  - **dialogues** instead of monologues;
  - No bullet-point recommendations;
  - focus on **theory** as well as on **practical case studies** and **specific professional contexts and skills requirements** relevant to radiological protection.
- Learning outcomes: developing 'ethical skills':
  - insights in complexity
  - critical thinking
  - mutual learning and understanding
  - reflexivity

Conclusion

Dialogues on Ethics, Science & Technology  
respect and transcend cultural differences

we were in →



more dialogues on Ethics, Science & Technology soon in a theatre near you!

## **Copyright © 2017 - SCK•CEN**

All property rights and copyright are reserved.

Any communication or reproduction of this document, and any communication or use of its content without explicit authorization is prohibited. Any infringement to this rule is illegal and entitles to claim damages from the infringer, without prejudice to any other right in case of granting a patent or registration in the field of intellectual property.

### **SCK•CEN**

Studiecentrum voor Kernenergie  
Centre d'Etude de l'Energie Nucléaire  
Belgian Nuclear Research Centre

Stichting van Openbaar Nut  
Fondation d'Utilité Publique  
Foundation of Public Utility

Registered Office: Avenue Herrmann-Debrouxlaan 40 – BE-1160 BRUSSEL

Operational Office: Boeretang 200 – BE-2400 MOL