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

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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
Risk and the importance of self-determination (as a principle of justice)
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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.
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Fairness: the **possibility of self-determination** ensured by ‘the right to be responsible’

<table>
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<tr>
<th>Risk for society</th>
<th>the right to co-decide</th>
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| Risk taken by an individual | the freedom to hurt yourself |
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- 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.
Societal trust around risk needs to be generated ‘by method instead of proof’
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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.
Societal trust around risk needs to be generated ‘by method instead of proof’

Seeking societal trust: the challenge for science
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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.
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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.
Ethics as a care for our human relationships
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The social problems we face today are ultimately complex
Ethics as a care for our human relationships
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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.
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
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’.

**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.
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Bangladesh
Ethics as a care for our human relationships

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Bangladesh

China
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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, ...).
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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
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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 →

Athens
Alpbach
Barcelona
Bergen
Berlin
Berne
Bohpal
Bratislava
Brussels
Bucharest
Budapest
Budweiss
Buenos Aires
Cape Town
Charlotte
Cordoba
Delft
Dublin
Espoo
Fukushima

Ghent
Hangzhou
Helsinki
Jackson Hole
Jülich
Karlsruhe
Kuala Lumpur
Kuopio
Lima
Lisbon
Ljubljana
London
Madrid
Manchester
Milano
Mol
Moscow
Munich
Nagoya
Nanchang

Nairobi
New York
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SCK•CEN
Studiecentrum voor Kernenergie
Centre d'Etude de l'Energie Nucléaire
Belgian Nuclear Research Centre

Stichting van Openbaar Nut
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Registered Office: Avenue Herrmann-Debrouxlaan 40 – BE-1160 BRUSSEL
Operational Office: Boeretang 200 – BE-2400 MOL