# Bridging the acceptance-acceptability-gap: Multinational nuclear waste repositories

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**ISEEH 2014**

# Introduction

- New technology brings great benefits but also new risks
  - Various attempts have been made to quantitatively or qualitatively assess risks, e.g. Probabilistic Risk Assessment
  - These method have been criticized for neglecting social aspects of risk: they requires a value judgment on what risk to accept
  - They further neglect ‘public acceptance’
- Public distrust safety of nuclear reactors engendered a discussion on safety, culminating in designing safe reactors
- Opposition by the public is often seen as potential obstacle
  - Public acceptance has sometimes been reduced to “marketing methods to maximize the likelihood of successful introduction” of technologies (Schulte et al. 2004)

# Thesis: ethical acceptability

- Public acceptance is a necessary but not sufficient criterion
  - There are important ethical aspects that it might overlook
- There are ethical analyses of new technology
  - But they are often conceptual analyses and lack empirical insights
- We must bridge the gap between these *islands* in the literature
  - By assessing the *ethical acceptability* of new technology
  - This includes insights as expressed by stakeholders
  - And insights from ethical theories and moral principles

# Structure of the talk

- Part 1: a review of public acceptance studies
  - And what they presumably cannot do
- Part 2: the case of multinational nuclear waste repositories
  - To illustrate why public acceptance is insufficient
- Part 3: a review of ethical analyses
  - And their lack of empirical input
- Part 4: A proposal to bridge the acceptance-acceptability gap
  - Wide Reflective Equilibrium

# Part 1:

## What public acceptance studies can't do

# 1. Incomplete or faulty information

- Acceptance could be based on incomplete or faulty information

- Case: Uranium enrichment facility in Louisiana
  - Local communities were requested to “nominate potential sites for a proposed chemical facility”
  - First problem: communities were never informed about the nature of these facilities
  - Second problem: no quantitative or qualitative risk assessment were presented: “it was impossible to know, reliably, the actual risks associated with the plant”

    - Case drawn from (Wigly and Shrade-Frechtte 1996)

# 2. Which *public*

- Which public should accept the new technology?
- In the Louisiana case, the opinion of host communities very close to the proposed facilities were not considered
- More generally, public acceptance stems from the ethical foundation of *informed consent*
  - When autonomous human-beings are being exposed to risk they i) should be fully informed and ii) they should consent to it
  - This principles comes from biomedical ethics, but its expansion to ‘ethics of technology’ highly problematic, because ‘informed consent’ is based on individual veto power

# 2. ….

- Which public should consent to new technology?
- Studies on ‘acceptability of renewable energy’ show that often nation-wide there is a consensus, while there a opposition at the local level
  - Of course, this does not mean that local communities should be overruled, because local minorities might be the ones directly affected by a technology
  - Example drawn from (Walker 1995)
- Different people uphold different values, and they have different interests
  - Whose opinion(s) should be decisive?
  - This is also the case in the ongoing shale gas debate

# 3. Distributional issues

- How are the risks and benefits distributed?
  - Think of the renewable energy example: benefits are nation-wide while the burdens are very local
- More complex: temporal distribution of burdens & benefits
  - This gives rise to questions of intergenerational justice
- Example: fossil fuel
  - Firstly, at what pace may we consume renewable resources?
  - Secondly, what level of environmental damage (including climate change) is acceptable for the future?
- Potentially, there is a tension between spatial and temporal justice (example: climate mitigation or adaptation)

# 4. Acceptance for wrong reasons

- Risky technology might be accepted for morally wrong reasons

- Compensation or bribe?
  - On the one hand, distributive justice might recommend compensation
  - On the other hand: without ethical guidelines, compensation could become an “exploitative, misleading or manuipulative instrument” (Hannis and Rawles 2013)

# 5. Procedural justice

- Acceptance might be achieved on the basis of faulty or unfair procedures

- There must be rules and procedures for decision-making
  - They should guarantee participation
  - Fair information transfer
  - Transparancy

# 6. International risks

- Some risks go in essence beyond national borders
- Example 1: climate change and international consequences
- Example2: geoengineering climate change
  - Intentionally manipulating climate change in the “right direction” has serious consequences for many countries beyond the executing country
  - How to deal with unforeseen consequences?
- Example 3: nuclear power plants at the national borders
  - Austria is being surrounded by these power plants in Germany, Italy and the Czech Republic

# 7. Intergenerational risks

- Many technological innovations introduce intergenerational risks and burdens
  - Fossil fuel combustion
  - Climate change issue and geoengineering
  - Nuclear waste dipsoal
- Intergenerational justice issues are not necessarily taken into account in public acceptance studies.

# Part 2:

## Ethical analysis and the lack of empirical insights

# Principles of medical ethics

- Autonomy
  - The patient has the right to refuse or choose his treatment
- Beneficence
  - The practitioner should act in the best interest of the patient
- Non-maleficence
  - Do not harm
- Justice
  - Concerns the distribution of scarce health resources, and the decision of who gets what treatment (fairness and equality)

# Criteria of acceptable risk

- Some ‘ethics of risk acceptance’ criteria stem from biomedical ethics
  - Voluntariness, informed consent (autonomy)
  - Precautionary principle (non-maleficence)
- Some are stemming from consequentialist ethics
  - Do the benefits justify the risks?
  - Risk cost-benefit analysis
- The availability of alternative technology

# ICRP principles

- *Justification Principle* (JP)
  - No practice shall be adopted unless its introduction produces a positive net benefit.
- *Optimization Principle* (OP)
  - All exposures should be as low as reasonably achievable (ALARA), economic and social factors being taken into account.
- *Dose Limit Principle* (DLP)
  - The doses to individuals shall not exceed the limits recommended for the appropriate circumstances by the Commission.

# Two problems of *ethical analysis*

- Firstly, moral principles are rather abstract (or vague)
  - They need to be *specified*, before applying them to technology
  - Analyzing the case, identifying moral dilemmas and presuppositions etc.
  - E.g. what does intergenerational justice say about technological options for nuclear power production (Taebi 2010)

- Secondly, ethical analyses are often conceptual and they lack empirical insights (e.g. stakeholders' opinions)
  - Exceptions are in biomedical ethics where usually the interest of one individual patient is at stake
  - Stakeholders' insights need to be added for the sake of pluralism (Doorn 2012)

# Part 3:

## Multinational disposal and the ethical issues that public acceptance studies could easily

# Why multinational repositories?

- Half a century of nuclear energy production and medical and industrial nuclear activities
- There are 30 nuclear power producing countries
  - Over 45 countries have expressed interest in nuclear power
- Currently several *small* members (with 1 or 2 reactors)
  - E.g. Netherlands, Slovenia, Brazil
  - The future is a **large** number of **small** nuclear power producers
- Multinational repositories have many benefits (for small members)
  - i.e. economic, safety and security (non-proliferation)
  - But they also bring many legal and political complexities

# Are multinational repositories feasible?

- Some countries have already passed laws forbidding the import of foreign waste (e.g. Sweden, Argentina)
- Still, they are high on political agenda, especially in Europe
  - Both EU and EC support proposals to investigate their feasibility
  - Austria, Ireland, Netherlands, Poland, Slovakia, Bulgaria, Italy, Lithuania, Romania and Slovenia are exploring the possibilities

# 1. Intergenerational justice and joint disposal

- Geophysical and geochemical properties of host geologic site determines long-terms uncertainties
  - And how fast radiation could reach the biosphere
  - In a multinational solution we can in principle choose geological formation that helps reduce uncertainty

- When the knowledge about their location will be lost, multinational repositories seem to support long-term safety
  - They reduce number of potentially risky facilities for the future
  - E.g. future better off if 15 European countries dispose of in 5 places rather than 15 places

# Their spatial injustice

- Multinational repositories could only be successful if one nation accepts other nations' waste
- So, they essentially create intragenerational injustice
  - Since the benefits of this waste have been enjoyed in different countries while the burdens are for one country
- One way is to compensate the host country
  - This is compensation in ex-ante analysis, so compensation for potential risk imposed
  - Rather than compensation for the caused damage as in liability issues and compensation law

# Moral relevance of national borders

- Proponents often cite Ljubljana as a an example
  - This city has lain in 6 different countries in 100 years
  - How relevant are national borders wen deciding on waste disposal with 200,000 years life-time?

- How legitimate is the current spatial injustice?
  - Should the neighboring countries have a voice if Slovenia decides to host multinational disposal
  - Slovenia's single reactor is shared with Croatia


## Europe Main Map at the Beginning of the Year 2000

Northwest Northeast
Southwest Southeast

# Justice in multinational repositories

| | Distributive justice | Procedural justice |
|---|---|---|
| **Spatial** (empirical & normative) | Fair risk benefit distribution<br><br>What is appropriate compensation | Decision-making procedure<br>• Informed consent<br>• Information provision<br>• Stakeholders involvement<br>• Who to compensate<br>• How to organize compensation<br>• Who should repair future damage? |
| **Temporal** (normative) | Burden/benefit distribution<br>• Acceptable risk transfer<br>• Temporal compensation?<br>• Comparing temporal risks and benefits | Not applicable |

# What if the public accepts them?

- The acceptance might be the result of an unequal starting position
  - Less wealthy countries would be opener to economic incentives
- Yet, there will be an inherent injustice created
  - Comparable to exporting of chemical waste from industrialized to non-industrialized (mainly African) countries in 70s & 80s
  - This culminated in the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal

# Part 4:

## Moving towards *Ethical Acceptability*

## A Rawlsian framework

# Acceptance necessary but not sufficient

- If we solely focus on public acceptance studies, we might overlook important ethical issues
- This might result in waste automatically being exported from North to South-Europe and from West to East-Europe
  - This might eventually result in legal bans for exporting and import of nuclear waste
- The broader ethical issues need to be addressed
  - But How?

# Wide reflective equilibrium (Rawls)

- Bottom-up ethics: intuitive judgments resulting in principles
- Top down ethics: deducing principles from moral theories

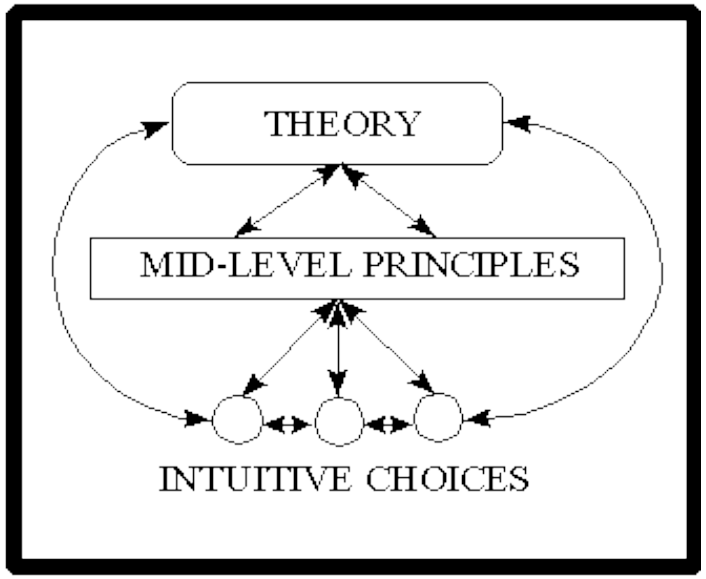
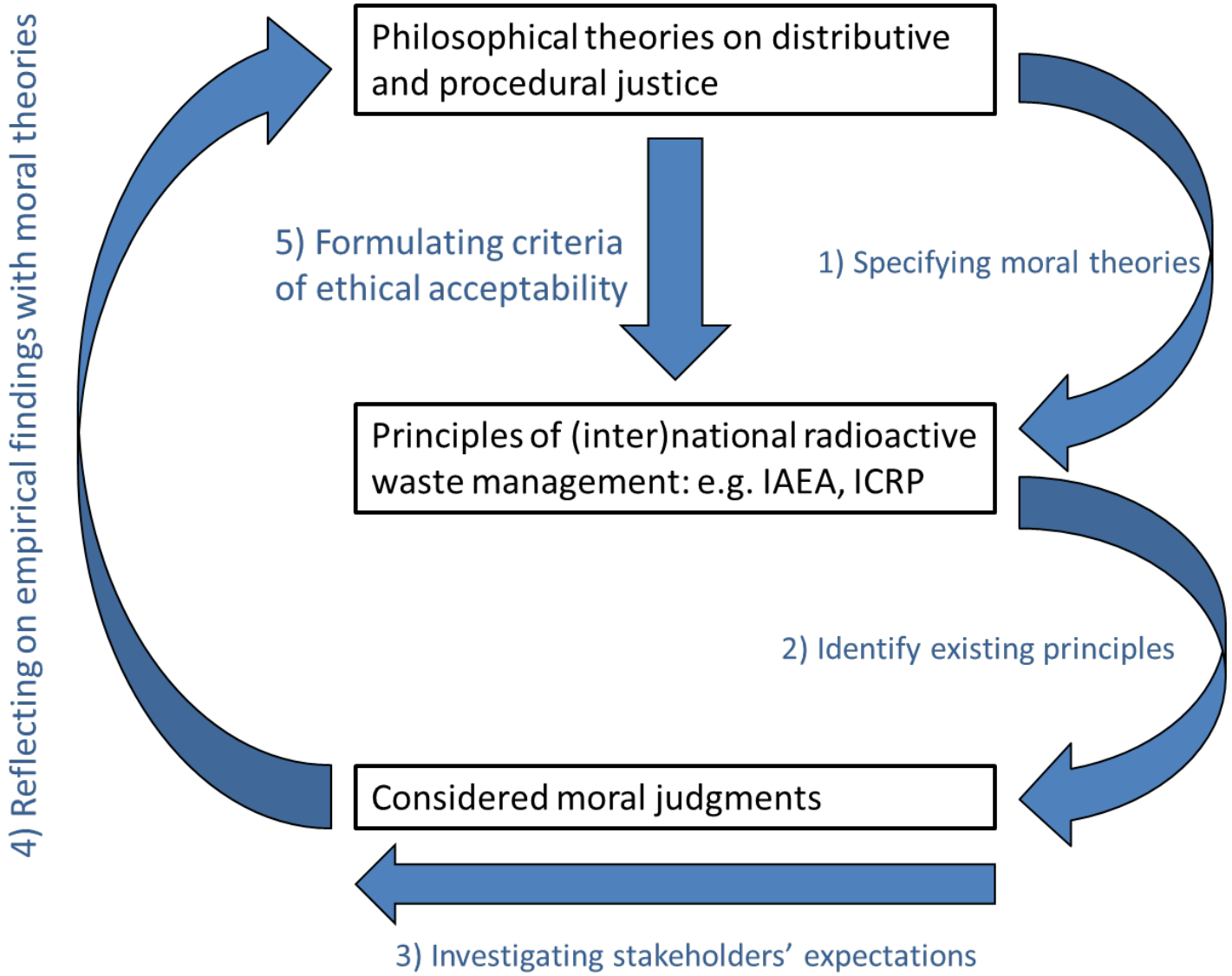



Illustration from Humanity Educating Philosophy, *Jeffrey W. Bulger*

http://www.bu.edu/wcp/Papers/TEth/TEthBulg.htm


Philosophical theories on distributive and procedural justice
1) Specifying moral theories
Principles of (inter)national radioactive waste management: e.g. IAEA, ICRP
2) Identify existing principles
Considered moral judgments
3) Investigating stakeholders' expectations
4) Reflecting on empirical findings with moral theories
5) Formulating criteria of ethical acceptability

# Conclusions

- We need to move towards broad assessments of new technology, certainly those with international and intergenerational risks
- The notion of *ethical acceptability* should include
  - Assessment according to ethical principles
  - And empirical opinions of stakeholders

# Thank you for your attention

Comments and questions are appreciated!

now or later by email

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# Two forthcoming publications

- Taebi, B. and I. R. Van de Poel, eds. Forthcoming. Socio-technical challenges of nuclear power production and waste disposal in the post-Fukushima Era. Special Issue of *Journal of Risk Research.*

- Taebi, B. and S. Roeser, eds. Forthcoming. The *Ethics of Nuclear Energy: Risk, Justice and Democracy in a post-Fukushima Era* Under contract with Cambridge University Press.