Ethics and technology 2.0: Responsible innovation and value sensitive design

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Overview

• Ethics and technology 2.0
• Responsible innovation
• Value sensitive design
Traditional approaches

- Ethics of technology
  - Focus on the external effects of technology on society

- Engineering ethics
  - Focus on the internal ethical issue in engineering
Ethics of technology

• Focuses on external effects of technology, not on the practice of developing technology or on engineering

• Not only safety and health but also effects on:
  • Sustainability
  • Relation with nature
  • Human autonomy and freedom
  • Authenticity
  • Human dignity
  • World view
Ethics of technology

• Often a negative or at least critical evaluation of technology

• Ethics as a brake
  • Anti-technological or
  • Ban on certain technologies

• Reactive rather than proactive
Engineering ethics

• Focus on practice of engineering and norms and values embedded in this practice
  • Often a focus on engineering codes of conduct

• Focus on ‘internal’ ethical issues
  • Integrity
  • Honesty
  • Trustworthiness
  • Conflicts of interest
  • Whistle blowing
• Little attention for broader social impacts of technology on society
  • Safety and health are addressed
  • Recently also sustainability
  • Less so for e.g. justice, privacy, democracy, etc.

• Little attention for design and for proactive role ethics
  • Focus usually on preventing harm rather than doing good
Ethics and technology 2.0

New features:

• From reactive to proactive
  • Not after a technology has been developed but already in the early phases (cf. video google Maps)

• Constructive approach
  • Ethics not as a break but to guide the development of technology

• Not only prevent harm but do good
  • Better technologies that contribute to a better society
Responsible Innovation
What is responsible innovation?

Product
• That reflects deeply held public values

Procedural
• A process for developing technology that meets certain procedural values
Responsible Research and Innovation is a transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view on the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products (in order to allow a proper embedding of scientific and technological advances in our society).

(Von Schomburg 2011)
Responsible Innovation is an activity or process which may give rise to previously unknown designs pertaining either to the physical world (e.g., designs of buildings and infrastructure), the conceptual world (e.g., conceptual frameworks, mathematics, logic, theory, software), the institutional world (social and legal institutions, procedures, and organization) or combinations of these, which - when implemented - "expand the set of relevant feasible options regarding solving a set of moral problems."

(van den Hoven 2013)
Product values

- Human safety
- Human well-being
- Health
- Sustainability
- Privacy
- Human autonomy
- Justice
- Democracy
- Responsibility
- Inclusiviness
- Etc.

(Van den Hoven et al. forthcoming Handbook of Ethics, Values and Technological Design)
Procedural values

- Anticipation
- Reflexivity
- Deliberation
- Responsiviness

(Owen et al 2013. A framework for responsible inovation)

Also mentioned:
- Accountability
- Transparency
- Learning
- Inclusiviness
- Opennness
Examples of responsible innovation in policy
Some example of responsible innovation

- EU: Responsible Research and Innovation (RRI)

- National Nanotechnology Initiative (USA): Responsible development of technology

- Netherlands Organization for Scientific Research (NWO): responsible innovation

- Chemical industry: Responsible Care
European Union

The European Commission (EC) ... wants to promote the responsible use of science and technology both within the European Union (EU) and worldwide. This goal involves striking a balance between ethical and socio-cultural diversity, both at the EU level and globally, while respecting internationally recognized fundamental values — and promoting their further development.
Figure 1.2: Basic Values from the EU Charter and the EU Treaty

- Dignity
- Freedoms
- Justice
- Equality
- Sustainability
- Citizens’ Rights
- Solidarity

Principles

Values
Responsible development of nanotechnology can be characterized as the balancing of efforts to maximize the technology’s positive contributions and minimize its negative consequences. Thus, responsible development involves an examination both of applications and of potential implications. It implies a commitment to develop and use technology to help meet the most pressing human and societal needs, while making every reasonable effort to anticipate and mitigate adverse implications or unintended consequences.
NWO: Responsible innovation

The concept of innovation pertains both to the introduction of new products, processes and services and to organisational and societal renewal. This programme description defines innovation primarily as the use of application of the results of science and technology. Responsible innovation concerns research, development and design, and takes societal values, interests, needs, rights and welfare into consideration.
Responsible Care

Responsible Care® is the global chemical industry’s unique initiative to improve health, environmental performance, enhance security, and to communicate with stakeholders about products and processes.
Responsible Care commits companies, national chemical industry associations and their partners to:

- Continuously improve the environmental, health, safety and security knowledge and performance of our technologies, processes and products over their life cycles so as to avoid harm to people and the environment.
- Use resources efficiently and minimise waste.
- Report openly on performance, achievements and shortcomings.
- Listen, engage and work with people to understand and address their concerns and expectations.
- Cooperate with governments and organisations in the development and implementation of effective regulations and standards, and to meet or go beyond them.
- Provide help and advice to foster the responsible management of chemicals by all those who manage and use them along the product chain.
Value Sensitive Design
Voting computers the Netherlands

- Judge forbids current models in 2007
- Voting secrecy not guaranteed
- No possibility for independent control on counting
Low overpasses Long Island
Low overpasses Long Island

- Designed by urban planner Robert Moses (1888-1981)
- Deliberate low as to avoid buses to go to the beaches
- Black people usually travelled by bus
- “Racist overpasses”
Value Sensitive Design

• Systematic attempt to include values of ethical importance in design

• Approach developed by Batya Friedman and colleagues

• Developed for information and communication technology (ICT), but broader applicable

Three types of investigations (Friedman et al.):

- **Empirical**
  - Stakeholders and their values

- **Conceptual**
  - Conceptualizations of relevant values
  - Trade-offs

- **Technical/engineering**
  - Embodiments of values
  - Value issues raised by technology
Three activities (Flanagan et al.)

- **Discovery.** This activity will result in a list of values that are relevant for the design project.

- **Translation.** Translation is “the activity of embodying or expressing ... values in system design” (Flanagan, Howe, and Nissenbaum 2008: 338).

- **Verification.** This is assessing, e.g. through simulation, tests or user questionnaires, whether the design indeed has implemented the values that were aimed at.
VSD tools and methods
Some VSD tools and methods

- Direct and indirect stakeholders
  - Direct stakeholders: users
  - Indirect stakeholders: other affected parties

- Value scenarios

- Value dams and value flows

- Envisioning cards
Values hierarchy

Values

Norms

Design requirements
Example of values hierarchy

Values
- Animal welfare

Norms
- Enough living space
- Presence of laying nests
- Litter
- Perches

Design requirements
- at least 450 cm² floor area per hen
- 10 cm feeding trough per bird
- 40 cm height over at least 65% of the area
- floor-slope of maximally 14%
Constructing a values hierarchy

- Can be done top-down and bottom-up
- Usually combination and iterative process

- Top-down: specification
- Bottom-up: for the sake of
**Intergenerational justice**

- Sustain availability of fuels
  - Effective fuel
    - Renewable
    - Reliable supply
    - Competitive price
  - Renewable
  - Reliable supply
  - Competitive price

- Reduce greenhouse gas emissions
  - High energy efficiency
    - No increased use of fertilizer and pesticides
    - No over-use of water and of other inputs
    - No increased air pollution
  - No additional greenhouse emissions from cultivation, production and transportation

- Avoid increase in other environmental problems
  - No increased use of fertilizer and pesticides
  - No over-use of water and of other inputs
  - No increased air pollution

**Care for nature**

- Maintain biodiversity
  - Cultivation should not have negative effects on biodiversity
    - No increased use of fertilizer and pesticides
    - No over-use of water and of other inputs
    - No increased air pollution

**Intragenerational justice**

- Avoid (additional) increase in food prices
  - Non-edible
    - Can be produced in developing countries
    - Can be produced on small scale and with limited investments
  - Non-edible
    - Can be produced in developing countries
    - Can be produced on small scale and with limited investments

- Provide opportunities to developing countries
  - Can be produced in developing countries
  - Can be produced on small scale and with limited investments

- Ensure just reward
  - Flexible use of license agreements for IP (intellectual Property)
    - Should not deteriorate working conditions for farmers
Global commodity prices, Jan 2005-Jun 2008
(Jan 2005 = 100)

- Sugar
- Wheat
- Rice
- Corn
- Palm Oil
- Soybeans
- Crude Oil

Source: mongabay.com
Value conflict

- There are at least two options for which at least two values are relevant as evaluation criteria.
- At least two different values evaluate at least two different options as best.
- The values do not trump each other.
<table>
<thead>
<tr>
<th>Crop</th>
<th>Used to Produce</th>
<th>Greenhouse Gas Emissions* Kilograms of carbon dioxide created per mega joule of energy produced</th>
<th>Use of resources during growing, harvesting and refining of fuel</th>
<th>Percent of existing U.S. Crop land needed to produce enough fuel to meet half of U.S. Demand</th>
<th>Pros and Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn</td>
<td>Ethanol</td>
<td>81-85</td>
<td>high high high high high high</td>
<td>157%-262%</td>
<td>Technology ready and relatively cheap, reduces food supply</td>
</tr>
<tr>
<td>Sugar cane</td>
<td>Ethanol</td>
<td>4-12</td>
<td>high high med med med</td>
<td>46-57</td>
<td>Technology ready, limited as to where will grow</td>
</tr>
<tr>
<td>Switch grass</td>
<td>Ethanol</td>
<td>-24</td>
<td>med-low low low low low</td>
<td>60-108</td>
<td>Won’t compete with food crops, technology not ready</td>
</tr>
<tr>
<td>Wood residue</td>
<td>Ethanol, biodiesel</td>
<td>N/A</td>
<td>med low low low low</td>
<td>150-250</td>
<td>Uses timber waste and other debris, technology not fully ready</td>
</tr>
<tr>
<td>Soybeans</td>
<td>Biodiesel</td>
<td>49</td>
<td>high low-med med med</td>
<td>180-240</td>
<td>Technology ready, reduces food supply</td>
</tr>
<tr>
<td>Rapseed, canola</td>
<td>Biodiesel</td>
<td>37</td>
<td>high med med med med</td>
<td>30</td>
<td>Technology ready, reduces food supply</td>
</tr>
<tr>
<td>Algae</td>
<td>Biodiesel</td>
<td>-183</td>
<td>med low low high high</td>
<td>1-2</td>
<td>Potential for huge production levels, technology not ready</td>
</tr>
</tbody>
</table>

Source: Martha Groom, University of WA, Elizabeth Gray, The Nature Conservancy, Patricia Townsend, University of WA
Innovation

• First generation biofuels: (existing) food crops

• Second generation: non-edible but competition for land and some negative ecological effects

• Third generation: based on bacteria and algae (but still very expensive)
Summary
Moral dilemma

- Agent A ought to do d
- Agent A ought to do e
- Doing d and e is (practically) impossible

- A ought to choose option x in the light of value V
- A ought to choose option y in the light of value W
- Choosing option x and option y is (practically) impossible
Innovation may sometimes solve moral dilemmas

- https://www.youtube.com/watch?v=hOlEt_Acq4o
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Critical questions

- Can we always anticipate value impacts of a technology?
- Constructive may become uncritical
- Is there enough agreement on the good?