POLITECNICO DI MILANO





Computer Ethics

Ethical questions in the design of technology

Viola Schiaffonati

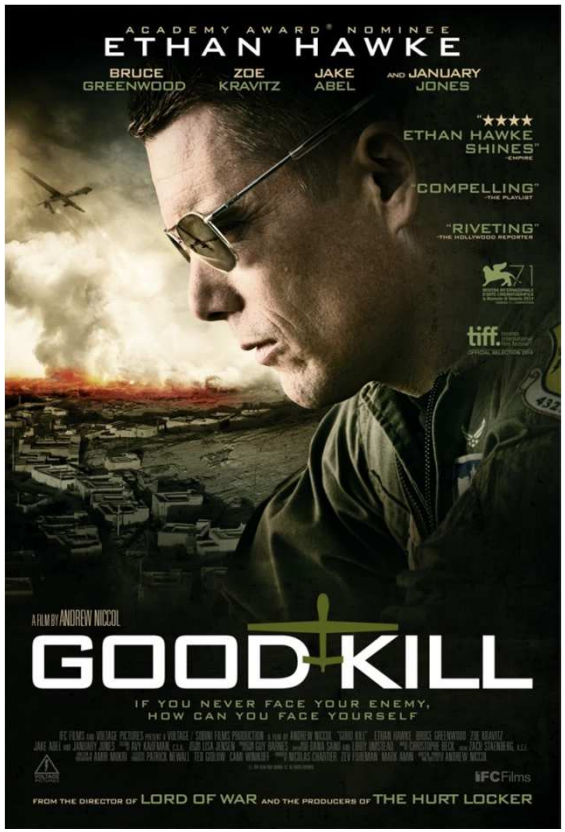
October 10th 2019

Criticizing the moral character

- Negative reactions to explicitly **behavior-steering technologies** (speed limiters in cars)
- First there is the fear that **human freedom** is **threatened** and that democracy is exchanged for **technocracy**
  - Reduction of autonomy perceived as a threat to dignity
  - Not humans but technologies are in control
- Second there is the **charge of immorality** or **amorality** (form of moral laziness with behavior-steering technologies)
- **Technologies** differ from **laws** in limiting human freedom because they are not the result of a democratic process
  - It is important to find a **democratic way** to "**moralize technology**"

Case: cubicle warrior

- ***Unmanned airplanes*** *Predators that can fire missiles and are flown by pilots located at the military base in the Nevada desert*
- *These robots can* ***precisely determine a certain target*** *and send the GPS-coordinates and camera images back to the operator*
- *Based on the information on his computer screen the* ***cubicle warrior*** *has to* ***decide actions****, for example whether or not to launch a missile*
- *His* ***decision*** *is* ***mediated by a computer-aided diagnosis*** *of the war situation*



Robots of the future

- *A future goal is that military robots will have built into their design **ethical constraints** ('ethical governor') which will suppress **unethical lethal behavior***
  - *Ex.: a military robot might advise a cubicle warrior not to push the button and shoot if the camera images tells the operator he is about to attack non-combatants*
  - *It is the **software** to provide to the cubicle warriors with **ethical advice***
- *A consequence is that humans then simply show a **type of behavior that was desired by the designers** of the technology instead of explicitly acting this way*

Designing mediations

- In order to build in specific forms of mediation in technologies, designers need **to anticipate the future mediating role** of the **technologies** they are designing
  - **Unintentional** and **unexpected forms of mediation** (ex.: energy-saving light bulbs used in places previously left unlit and hence increasing energy consumption)
- Designers cannot simply "inscribe" a desired form of morality into an artefact, because this also depends on
  - **Users** that interpret technologies
  - **Technologies** themselves which can evoke **emergent** forms of mediation

Strategies for designing mediations

- **Anticipating mediation by imagination**
  - Trying to imagine the ways technology-in-design could be used to deliberately shape user operations and interpretations
- Augmenting the existing design methodology of **Constructive Technology Assessment** (CTA)
  - **CTA** is an approach in which TA-like efforts are carried out **parallel to the process of technological development** and are **fed back** to the development and design process
  - Not only to determine what a technology will look like, but all **relevant social actors**

Not only technical aspects

- **Technology design** appears to entail **more than inventing functional products**
- The perspective of technological mediation reveals that **designing** should be regarded as a **form of materializing morality**
- The **ethics of engineering design** should take more seriously the **moral charge of technological products**, and rethink the **moral responsibilities of designers** accordingly

Ethical issues in design

- **Design process** is a central area where **ethical considerations** concerning technology arise
  - Crucial decisions regarding technology are made in the design process
- Ethical questions related to technology development are **reflected** in the **design process**
  - Design process crucial for the **proper working** of a technology, **possible risks**, and **side effects**

Design process

- **Engineering design** is the activity in which certain **functions** are translated into a blueprint for an artifact, systems, or service that can fulfill these functions with the help of **knowledge**
  - Ex.: transport between two riverbanks
  - **Function** or social goal can be translated into a **technical solution** in several ways (bridge, tunnel, ferry, cable-lift)
  - Not only function but **additional design requirements** (speed of transport, costs, building time, sustainability, safety) are to be taken into account

Iteration

- Design process is an **iterative process**
  - Problem analysis and formulation, conceptual design, simulation, decision, detail design, prototype development and testing

Problem analysis and formulation

- Stage of the design process in which the designer analyzes and formulates the **design problem** and the **design requirements**
- In formulating the **design problem** a certain **perspective** may implicitly or explicitly be chosen (and this has ethical relevance)
  - Ex: design of a search engine for the Internet
  - Perspective of the company (operate properly and use to use, store information); perspective of the user (storage of search data as a violation of privacy)
- In formulating the **design requirements ethical considerations** have to be taken into account
  - Safety, health, the environment, sustainability, social consequences

Conceptual design

- Stage with the aim to generate concept design
- **Creativity** is of major importance as the virtue of being able to think out or invent new, often unexpected, options or ideas
- Is creativity a **professional virtue** and not a moral one?
  - However, it can be important to help bridge seemingly **opposed moral values**
  - Ex.: design of the storm surge barrier (Netherlands 1972) as a creative compromise to balance the two moral values of **safety** and **ecological care**

Simulation

- Stage in which the designer checks through calculations, tests, and simulations whether the **concepts designed** meet the **design requirements**
  - **Reliability of prediction** is a **methodological** issue, but **moral considerations** play a partial role in **how much** reliability in predictions is desirable or acceptable

Decision

- Stage in which **various concept designs** are **compared** with each other and a choice is made for a design that has to be detailed
- Design criteria are design requirements formulated in such a way that products meet them to a **greater** (safety, sustainability, ease of use) or **lesser** extent (costs)
- Trade off is a compromise between design criteria
  - **Different design criteria** (safety, sustainability, ease of use) have a **moral motivation**

Detail design

- Stage in which a chosen design is elaborated on and detailed
- **Ethical questions** can arise
  - Choices about **materials** to use
  - Materials differ in terms of risks, health effects, and environmental impact
  - Ex.: use of impoverished uranium as a stabilizer in airplanes that functionally is a suitable material but it is accompanied by certain health risks

Prototype development and testing

- After the design is detailed a prototype is constructed and tested
- **Test** is an **execution** of a **technology** in **circumstances** set and **controlled** by the **experimenter**, and in which data are gathered systematically about how the technology functions in practice
- Tests are **fallible** too
  - They are not always representative of the circumstances in which the product eventually has to function

Manufacture and construction

- **Ethical issues** that may arise during manufacture and construction (some can be anticipated and addressed in design)
  - **Labor conditions** (strong pressure of the market to reduce costs of production)
  - **Environment** and **sustainability**
  - Construction **safety**

Value conflicts

- When different design criteria that conflict correspond with different moral values this is a value conflict
- A value conflict arises if
  1. A **choice** is to be made between at least **two options** for which at least two values are relevant as choice criteria
  2. At least **two different values** select at least **two different options** as best
  3. The values **do not trump** each other
- Different ways in which this evaluation can take place

Example

- Alternative coolants for CFC (chlorofluoro-carbon) 12
  - How should **environmental concerns** regarding the design of new coolants for refrigerators be weighted against **safety concerns**?

Cost-benefit analysis

- Method for comparing alternatives in which all the relevant **advantages** (benefits) and **disadvantages** (costs) of the options are **expressed in monetary units** and the overall monetary cost of each alternative is calculated
- Cost-benefit analysis is more controversial if non-economic values are also relevant
  - **Contingent validation** is an approach to express values like safety and sustainability in monetary units by asking people how much they are willing to pay for a certain level of safety or sustainability
- Two or more values are **incommensurable** if they cannot be expressed or measured on a **common scale** or in terms of a **common value measure**

Thresholds

- An approach to cope with conflicting design criteria is to set a **threshold** for each **criterion**
- A threshold is the **minimal level of** a (design) **criterion** or **value** that an alternative has to meet in order to be acceptable with respect to that criterion or value
- Setting threshold occurs also in **legislation** (standardization) and in **technical codes** and **standards**
  - Minimal level of safety

Reasoning

- A non-calculative approach that aims at **clarifying the values** that underlie the conflicting design requirements and consists of three steps
  1. Identifying relevant values
  2. Specifying the values
  3. Looking for common ground among values
- The occurrence of value conflict is treated merely as a **philosophical problem** to be solved by **philosophical analysis** and **argument**

Value Sensitive Design

- An approach that aims at **integrating values** of **ethical importance** in a **systematic way** in design
- To solve value conflicts **by technical means**
  - Most values do not conflict as such but only in the light of certain technical possibilities
- Approach that aims at integrating three kinds of investigations
  - **Empirical investigations** (contexts and experiences of people affected by technological designs)
  - **Conceptual investigations** (values at stake and possible trade offs)
  - **Technical investigations** (relationship between design and values)

How to choose?

- Although alternatives score differently for various values the choice between them is **not random**
- The methods are **useful**
- Which method is best will depend on the **situation**
  - The discussion of pros and cons can help you make a choice based on **proper reasons**
  - It is good to be **aware** of the **shortcomings** of the various methods so that you can try to limit these in concrete situations

Regulatory frameworks

- A regulatory framework is the totality of (product-specific) **rules** that apply to the **design** and **development** of a technology
- It is a part of **morality** because it deals with **judgments** about **how to act rightly** that are laid down in rules
  - It can help researchers to make **ethically relevant decisions** in the design process
  - This does not imply that researchers can always just follow the existing **regulatory framework without asking some further questions**

Some open issues

- Some people argue that ethical issues in technology arise due to how technologies are used and can, therefore, not be addressed in design. Do you agree? Is design necessarily irrelevant when most ethical issues arise due to how technologies are used?
- In cost-benefit analysis, human lives are often expressed in money. Do you consider this an acceptable practice? If it is not acceptable, how should we than determine how much money to spend on increasing human safety?

References

- Devon, R. and van de Poel, I. (2004). "Design Ethics: The Social Ethics Paradigm". *International Journal of Engineering Education,* 20 (3), 461-469
- Van de Poel, I. and Royakkers, L. (2011). *Ethics, Technology, and Engineering*, Wiley-Blackwell