

The background of the slide is a photograph of the TU Delft campus. In the center, there is a large, grey, conical structure with a metal lattice tower on top. To the right, there is a modern building with a glass facade. In the foreground, there is a large, green lawn with a white railing, and a wide set of concrete steps leading up to it. Several people are sitting on the steps and walking on the lawn. The sky is clear and blue.

# The Ethics of Cloud Computing

## A Conceptual Review

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# ETICA project



- Ethical Issues of Emerging ICT Applications
  - Funded by the European Commission
  - International & Multidisciplinary collaboration
- Aim:
  - identify ethical issues arising from ICTs
  - in the coming 10 to 15 years.
    - E.g. Ambient Intelligence, Affective Computing & Cloud Computing
  - Evaluate issues → support addressing issues (government + R&D)



# Computer Ethics

- studies and analyzes social and ethical impacts of ICT
- 1960 – 1990:
  - ethical reflection **after** the technology is developed and widely adopted
  - Negative image of ethics, “slows down innovation”
- End 90’s – now:
  - the value turn
  - Use ethics **before** the technology is developed
  - Include moral values in system design: ownership, trust, autonomy, informed consent, privacy, human welfare, etc...

# Cloud Computing

- Users **outsource** their computing needs to third parties, over the Internet
- The **control** shifts from users to third parties
- Multiple services can be **interconnected** to provide a specific service
- Data in **multiple physical locations** around the world, possibly owned and administered by different organizations
- All this **complexity is hidden** from the user



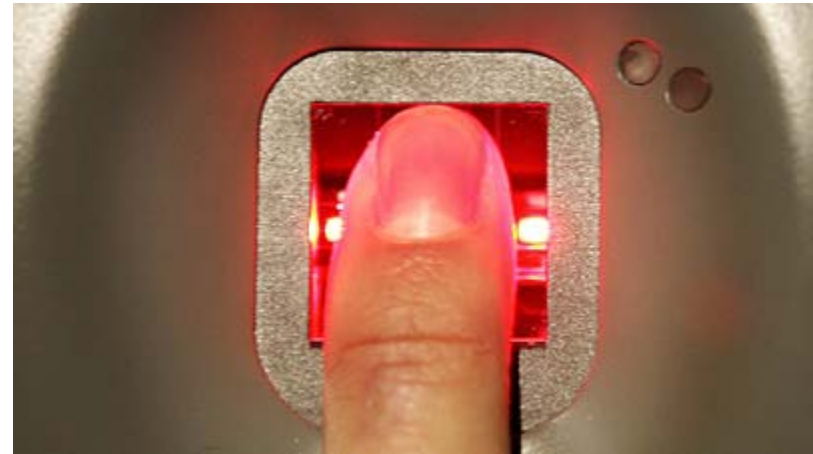
# Control and Responsibility

- Users relinquish **control** over computation and data
- Unauthorized access, data corruption, who is **responsible**?
- **Deperimeterisation**: disappearing of boundaries between systems and organizations
- The border between organization + infrastructure blurs, but also the **accountability**
- Problem of **many hands**, service oriented architecture



# Function creep

- Data collected for a specific purpose can be used for **other purposes**
- A database with biometric data for authentication can be used for crime investigation
- **Unimplementing** might become difficult because of wide scale use



# Privacy

- There is a consensus that it is important, the concept is hard to **explicate**
- Aim to constraint access to **certain types** of personal data. Which types? Conception differs per **type of data/context**
- Different opinions of privacy by the service providers
- Different layers/service providers with different policies

The Facebook logo, consisting of the word "facebook" in white lowercase letters on a blue rectangular background.

**HOW LONG WILL IT TAKE  
YOU TO DELETE THIS IMAGE  
FACEBOOK?**

**I UPLOADED IT AND ALSO  
DELETED IT ON JULY 1, 2009  
AT 9AM CENTRAL TIME.**

**I DON'T THINK YOU DELETE  
PICS AS FAST AS YOU CLAIM.**



# Privacy across borders and diversity

- **Legislation differences**, i.e.: Facebook case in Germany, Google Maps in China
- **Cultural differences**: emphasis on the concept of community and negative concept of privacy in Eastern cultures (Capurro, 2005)
- **A minimal sense of privacy** is shared, but an internationally accepted rich sense is lacking (Moor, 2004)
- **Convergences of values** and norms do take place, i.e. incorporation of traditional Chinese values and Western values (Yao-Huai, 2005)



# Privacy across borders and diversity

- An opportunity to take **pluralistic ground** and avoid relativism. Globalization can play a role
- But.. Risk of **cultural imperialism**.
- Do not impose values, but **bridge cultures**. Ethics can play an important role in reaching the middle ground (Moor, 2005)

# Precautionary Principle

- Precautionary principle: **refrain from actions** in the face of scientific uncertainties about serious or irreversible harm
- In software engineering ethics: do not abort the development of the technology, but **anticipate consequences** that are not foreseeable (Pieters 2009)
- **Uncertainty** is no excuse not to do this
- Technical standardizations, professional , national and international **law and regulations** must follow

# Future for Cloud Computing

## Ethics: Value Sensitive Design

- Include **moral values** of ethical importance in design
- Uses **empirical studies**, interviews with stakeholders to include their views into the design
- **Conceptualize** the values
- **Translate** it into technical design
- Why?
  - Design is about changing the world, inherently normative
  - Designers have been doing it all the time: but make it more explicit, transparent and systematic
  - Design for X: Design for maintainability, Design for reliability, etc.

# Future for Cloud Computing

## Ethics: Value Sensitive Design

- Use is important
  - Same technology in different contexts realizes different values
- Design is important as well
  - Differently designed technologies (with same function) in same user context realize different values
- Deal with **value trade-offs** (privacy vs accountability, trust vs security), and include **user views** into the design by means of empirical investigations
- **Discover** values, **translate** them into design, **verify**

# Questions?

