Teaching Computer Ethics: Challenges and Methodologies.

The case of Italian Universities

Uppsala University

Uppsala, 5 May 2009

Norberto Patrignani
"... the responsibility of choosing is with you,
God is blameless"

"The Republic" by Plato (360 B.C.)
translated by Benjamin Jowett,
Late Regius Professor of Greek
University of Oxford, 1994

Platone, "Repubblica", X, 617 e, p.451
Opere, volume II,
Editori Laterza, Bari, 1966

Platone (Πλάτων), (Atene, 427 a.C. - 347 a.C.)
"La Scuola di Atene" (part.), Raffaello Sanzio, 1509
Stanza della Segnatura, Palazzi Pontifici, Roma
Computer Ethics (IT & Business Ethics)  
Corporate Social Responsibility (Sustainable Development transposed to the Corporate World) (*)

**Profit**
- Economic: short term (Profit)
- Conventional Financial Performance
- Ability to contribute to the Economic Development of the Corporate Operating Area and Stakeholders
- Respect for the Laws of Fair Competition (absence of corruption, no abuse of monopoly power, etc.)

**People**
- Social: medium term (People)
- Social Consequences of the Activities of Companies for all the Communities concerned:
  - Employees (Working Conditions, Wages, Non-discrimination, etc.)
  - Local communities (Harmful Effects, Respect for Crops)
  - Customers (Safety and Psychological Impact of the Products of Companies)
  - Suppliers
  - Society as a whole

**Planet**
- Environmental: long term (Planet)
- Compatibility between the Activities of Companies and the Sustainability of Ecosystems
- Analysis of the Impacts of Companies and their Products in terms of
  - Resource Consumption
  - Waste Production
  - Hazardous Pollutions, etc.

(*) Source: ORSE (Observatoire sur la Responsabilité Sociétale des Entreprises), www.orse.org. 
The "Triple Bottom Line": Evaluating the Performance of Companies according to 3 new sets of factors
Corporate Social Responsibility (IT)

Fonte: IlSole24Ore, Rapporto "Responsabilita' Sociale", 25 Marzo 2008
Hyborgs

Human Role / Control

High

Medium

Low

Computer Role

Low

Medium

High

Hospitals

Car Rental Companies

Banks

Airlines

“pure” Hyborgs
Workplace
Bridging Business Ethics & Computer Ethics

- Responsible IT Strategy
- IT Users vs IT Providers
- Main principles
  - Accessibility
    - Design for All, eInclusion, Sensorial-Barrier Free
  - Participatory Design
    - Include Users in the Design process
    - Hyborg Management (Hybrid Org, Computer Processes vs Human Processes)
  - IT & Workplace
    - Deskilling, Personal Use (Web/Internet, eMail, Software, Print/Copy)
    - Security vs Productivity vs Privacy Ergonomy, Nomadic Work, Lifestyle
  - Content & Education
    - Knowledge Management, Comunity-of-Practice
    - Lifelong Education, Computer Ethics
  - Copyrights
    - Intellectual Property Management
    - Open Source, Creative Commons, Open Formats
  - Hackers
    - In-house Competence Leverage, Ethical Hacking
  - Computer Crimes & Privacy
    - Security vs Privacy, Corporate Security Policies & Code of Ethics integration
    - Social Gaps (behavior vs policy) and Sociotechnical Gaps (policy vs infrastructure)
    - Privacy vs Customers Data Mining
  - Computer (Un)reliability
    - Technical Gap (Expectations vs Actual)
    - Life-Critical applications?
    - Software update, zero-days vulnerability, Titanic Effect
  - Artificial Intelligence, Nanotech
    - Roboethics, Precautionary Principle
  - War
    - Ethical Funds, Stakeholders Awareness
  - Ecology & Recycling
    - HW / SW provisioning, Energy Consumption
    - Providers certification (Social, Environmental)
Requirements from stakeholders

- Info-Sphere, Info-Ethics
- New stakeholders
  - Future generations,
  - The Planet Earth
- Transparency in Internet time
- Value Sensitive Design
- Participatory Design
- Design4All principles
- FP7 Ethical requirements / reviews
Why we need Computer Ethics

Kranzberg's 1st Law

"Technology is neither good nor bad, nor neutral"

M.Kranzberg,
"The Information Age: Evolution or Revolution?",
in Bruce R. Guile (ed.), "Information Technologies and Social Transformation",
Washington D.C., 1985, National Academy of Engineering, p.50
Richard De George's "Computer Ethics"

4 themes

• The Myth of Amoral Computing
  – This refers to the widespread phenomenon that the ethical dimension of Computer and Information Technology development and use have been largely ignored by both those in the industry and by the general public.

• The Lure of the Technological Imperative
  – The tendency to pursue technological development to the extent possible with little thought to the social implications and repercussions of such development.

• The Danger of the Hidden Substructure
  – In part is a result of the fact that so much computer and information technological development and use take place behind the public scene and are not transparent to users or those affected by it, thus precluding public debate about the ethical impact of such development and use.

• The Acceptance of Technological Inertia
  – The widespread failure to appreciate the fact that although computers and Information Technology have developed in certain ways, from an ethical point of view these are not necessarily the best ways they could have developed. Where this is the case, they can and should be changed.

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Computers and Information Technology should help and serve people and society. Where they do not, they should not be passively accepted.

Do artifacts have politics?

Politeia vs Techne*

centralized

Nuclear Plant

Boeing 747

Aircraft carrier

Railway

Network Control Center

System Network Architecture

Proprietary Software

Software as Service

de-centralized

Solar Power

Bazaar

Glider

Rowing Boat

Car

LAN Desktop

Home PC

Internet

Free Software

PC Software

Sailors must yield to their captain's commands
Plato, Republic

Even in the absence of the nucleus, 70% of the network remains connected (the peer-connected component).

30% of the network (the isolated component of leaves or small clusters) can reach the rest of the network only through the nucleus.

Source: "A model of Internet topology using k-shell decomposition", Shai Carmi, Shlomo Havlin, Scott Kirkpatrick, Yuval Shavitt, and Eran Shir
Applied Physical Sciences, Proceedings of the National Academy of Sciences, USA

Degree
(number of immediate neighbors of a node)
Internet history

Vinton G. Cerf (New Haven, 1943 - )
Robert E. Kahn (New York, 1938 - )

Turing Award (2004) (by ACM)
For pioneering work on internetworking including the design and implementation of the Internet's basic communications protocols, TCP/IP (1973) and for inspired leadership in networking

Wiener Award (1998) (by CPSR)
A large open international community of individuals, engaged in the development of new Internet standard specifications, for its tremendously positive technical and other contributions to the evolution and smooth operation of the Internet

IETF (1986 - )
The Internet Engineering Task Force is a large open international community of network designers, operators, vendors, and researchers concerned with the evolution of the Internet architecture and the smooth operation of the Internet. It is open to any interested individual.
The Web's 20th birthday

Tim Berners Lee (London, UK, 1955 - )
Robert Cailliau (Belgium, 1947 - )

     CERN (Conseil Européen pour la Recherche Nucléaire), the European Particle Physics Laboratory

Berners-Lee and Cailliau on March 13 2009, at CERN's WWW@20 celebration.
The Web's 20th birthday

13 March 1989: the Berners-Lee writes the 1st paper about the WWW, handwritten note at the top from his boss, Mike Sendall: "vague, but exciting."

30 April 1993
the WWW enters the Public Domain
Knowledge Connectivity

Web X.0

Semantic Web

Natural Language Search

Knowledge Networks

Collective Intelligence

Social Networks

Access to Knowledge

HyperMedia Navigation

Portals

Web Services

P2P

HyperMedia Navigation

XML

Web X.0

WEB3.0

WEB4.0

WEB1.0

WEB2.0

Internet

Source: Adapted from Nova Spivack, 2004
# Accessibility, Universal Access & Digital Divide

## INTERNET USAGE STATISTICS

**The Internet Big Picture**

**World Internet Users and Population Stats**

<table>
<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>955,206,348</td>
<td>4,514,400</td>
<td>51,065,630</td>
<td>5.3%</td>
<td>3.5%</td>
<td>1,031.2%</td>
</tr>
<tr>
<td>Asia</td>
<td>3,776,181,949</td>
<td>114,304,000</td>
<td>578,538,257</td>
<td>15.3%</td>
<td>39.5%</td>
<td>406.1%</td>
</tr>
<tr>
<td>Europe</td>
<td>800,401,065</td>
<td>105,096,093</td>
<td>384,633,765</td>
<td>48.1%</td>
<td>26.3%</td>
<td>266.0%</td>
</tr>
<tr>
<td>Middle East</td>
<td>197,090,443</td>
<td>3,284,800</td>
<td>41,939,200</td>
<td>21.3%</td>
<td>2.9%</td>
<td>1,176.8%</td>
</tr>
<tr>
<td>North America</td>
<td>337,167,248</td>
<td>108,096,800</td>
<td>248,241,969</td>
<td>73.6%</td>
<td>17.0%</td>
<td>129.6%</td>
</tr>
<tr>
<td>Latin America/Caribbean</td>
<td>576,091,673</td>
<td>18,068,919</td>
<td>139,009,209</td>
<td>24.1%</td>
<td>9.5%</td>
<td>669.3%</td>
</tr>
<tr>
<td>Oceania / Australia</td>
<td>33,981,562</td>
<td>7,620,480</td>
<td>20,204,331</td>
<td>59.5%</td>
<td>1.4%</td>
<td>165.1%</td>
</tr>
<tr>
<td><strong>WORLD TOTAL</strong></td>
<td><strong>6,676,120,288</strong></td>
<td><strong>360,985,492</strong></td>
<td><strong>1,463,632,361</strong></td>
<td><strong>21.9%</strong></td>
<td><strong>100.0%</strong></td>
<td><strong>305.5%</strong></td>
</tr>
</tbody>
</table>

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Source: Internetworldstats.com, 2009
Accessibility, Universal Access & Digital Divide

“... There are more hosts in New York than in all of Africa”
U.N. Secretary-General Kofi Annan, “Call for a bridge that spans the digital divide”
May 17, 2001

Towards an "Internet Bill of Rights"?
(WSIS, IGF, ...)

A Global Network Ethics?

Proper Blending
• Architecture
• Education
• Law
• Market

TESTIMONY OF
LAWRENCE LESSIG
C. WENDELL AND EDITH M. CARLSMITH
PROFESSOR OF LAW
STANFORD LAW SCHOOL

SENATE COMMITTEE
ON COMMERCE, SCIENCE AND TRANSPORTATION

HEARING ON
“NETWORK NEUTRALITY”

FEBRUARY 7, 2006

INTRODUCTION

Mr. Chairman, and Members of the Committee, my name is Lawrence Lessig, and I am a professor of law at Stanford Law School. For the past decade I have been researching the relationship between technology and Internet policy, and in particular, the relationship between the architecture of the Internet and innovation. I am therefore happy to have the opportunity to address the question that this Committee is now considering — whether Congress should enact rules to protect network neutrality.

To answer that question, this Committee must keep in view a fundamental fact about the Internet: as scholars and network theorists have extensively documented, the innovation and explosive growth of the Internet is directly linked to its particular architectural design. It was in large part because the network respected what Salter, Clark and Reed called “the end-to-end principle” that the explosive growth of the Internet happened. If this Committee wants to preserve that growth and innovation, it should take steps to protect this fundamental design.

In my view, the most important action that this government has taken to preserve the Internet’s end-to-end design was the decision by Chairman Michael Powell to commit the FCC to enforce what he referred to as the Internet’s four “Internet Freedoms.” Building upon an idea first presented to this Committee by Microsoft’s Craig
Internet Governance

Source:
Lawrence Lessig, 
"Code and other laws of cyberspace", 
Basic Books, New York, 1999
## e-Democracy

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Many-to-many</td>
<td>• Virtual decision vs Real Institutions</td>
</tr>
<tr>
<td>• Free or Low Cost</td>
<td>• Consensus Processes Undefined</td>
</tr>
<tr>
<td>• Instant decisions, Speed</td>
<td>• No (Few years) Experiences</td>
</tr>
<tr>
<td>• Glocal, Ubiquity, Mobile</td>
<td>• Internet Governance Undefined</td>
</tr>
<tr>
<td>• Enforceable Transparency</td>
<td>• Rules, Code of Conduct?</td>
</tr>
<tr>
<td></td>
<td>• Less Shared Values?</td>
</tr>
<tr>
<td></td>
<td>• Community Definition</td>
</tr>
<tr>
<td></td>
<td>• What Decisions Online?</td>
</tr>
<tr>
<td><strong>Opportunities</strong></td>
<td><strong>Threats</strong></td>
</tr>
<tr>
<td>• Unlimited Access to Knowledge</td>
<td>• Knowledge Privatization</td>
</tr>
<tr>
<td>• Deep &amp; Broad Discussions</td>
<td>• De-Responsability</td>
</tr>
<tr>
<td>• More Informed Decisions</td>
<td>• Confusion Virtual vs Real</td>
</tr>
<tr>
<td>• Global Warming Reduction</td>
<td>• Information Overload</td>
</tr>
<tr>
<td>• eInclusion for Disabled &amp; Elderly</td>
<td>• Too Much Speedy Decisions</td>
</tr>
<tr>
<td>• Improved Participation</td>
<td>• Minds Limited Bandwidth</td>
</tr>
<tr>
<td>• Direct Democracy, Iper-Democracy?</td>
<td>• Big-Brother</td>
</tr>
<tr>
<td></td>
<td>• Diversity Loss (Culture, Gender, etc.)</td>
</tr>
<tr>
<td></td>
<td>• Yes / No Voting</td>
</tr>
<tr>
<td></td>
<td>• No Opponents Interactions / Facing</td>
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<tr>
<td></td>
<td>• Voting Software (Un)Reliability</td>
</tr>
<tr>
<td></td>
<td>• Digital Divide</td>
</tr>
<tr>
<td></td>
<td>• Net Neutrality Not Guaranteed</td>
</tr>
</tbody>
</table>

"Ancient" Virtues of Democracy vs "e-Participation" Tools

Social Networks Issues
Workplace

Quantity and Quality of Jobs

Computer Professionals Role

Participatory Design

Hyborgs (Hybrid Organizations)

Business Processes Managed by Computers

Bridging Business Ethics & Computer Ethics
Content & Education

Human Beings

Wisdom

Knowledge

Information

Data

Bits

Computers

Teacher: Knowledge Engineer?

Search Engines Ethics

Semantic Web Issues

Videogames Ethics

Virtual vs Real World

Social Networks
CopyRigths

IT = The Ultimate Technology to Copy & Re-Mix From the Past

Rewarding Innovators

Creative Commons (Some Rights Reserved) vs All Rights Reserved

Open Source vs Proprietary Software

Innovation by "Standing on the shoulders of the giants"*

*: Isaac Newton, Letter to Robert Hooke, 15 February 1676
Hackers

Do We Need Skilled People? (for Testing/Stressing to the Extreme Complex Systems)
Ethical Hackers

IBM - Ethical hacking - Mozilla Firefox


Ethical hacking

Simulate a real intruder’s attacks but in a controlled, safe way for you. Our ethical hackers can tell you what they find and how you can fix it to keep them out.

Service detail

How do you find out what hackers can get into before they’ve tried?

Highlights

- IBM’s ethical hackers can simulate a real intruder’s attacks but in a controlled, safe way for you.
- And they’ll tell you what they find and how you can fix it to keep them out.

When you provide a service to users over the Internet, such as a database linked to your webserver, you expose your organization to new risks. Every service opens a new path between the Internet and your organization. These paths to your organization’s network and data can be exploited by “hackers.” Your organization can be embarrassed or interrupted in the best cases, and can lose customers and money in the worst.

IBM Security Consultants can help your organization to minimize the risk of a hacker causing damage to your network by performing a range of intrusion tests using the same techniques known to be used by the most common hackers.

Service covers:

- A review of your overall network design to determine how it effectively detects intrusions, outside networks from gaining access to your internal, trusted networks and systems.
- A test designed to exercise all components within the scope of the project in an attempt to gain unauthorized access to your internal network from three perspectives: a low-level solitary hacker, a small team of competent hackers, and an expert team of highly motivated hackers.
- A report describing the strengths and weaknesses found in the various intrusion test scenarios with recommendations for immediate and long term improvements.

Price:

The contract amount for IBM’s Ethical Hacking typically ranges from $15,000 to $45,000 for a 30-day project. Ethical hackers are paid hourly and must be available at times that best suit your environment. These services can also be performed at regular intervals. Any service completed must be customized to your unique needs. Prices will vary accordingly.
Privacy

National Security vs Orwellian Society

Civil Liberties vs Powerful (& Very Large Organizations)

Monitoring ALL Communications

Opt-In vs Opt-Out

US vs EU

Ambient Intelligence (AmI) Issues

"Victim-less" Crimes Are Becoming Easy to Commit
How to Protect Critical Systems From Computer Crimes?
THE TITANIC EFFECT (Source unknown):
The severity with which a system fails
is directly proportional
to the intensity of the designer's belief
that it cannot.

COROLLARY:
The quantity and quality of built-in redundancy
is directly proportional to the degree of concern
about failure.
A.I. Nanobots

Source: Wired, July 2002

What Decisions Should (Not) Be Delegated to Machines?

Do We Need "Autonomous" Robots?

Embedding Ethics in Robots?

NanoBots?

Man-machine hybrids?
Level 2: Tele-Operator Controlled Autonomous Weapons

"Gladiator"
Carnegie-Mellon Robotics Institute,
United Defense

"Smart" Weapons Developments
Design to Kill?

Source: Wired, May 2005
Ecology & Recycling

Red shows the heaviest concentration of CO$_2$
Blue shows the least amount

IT Contribution (2006): 2%
while running but producing and wasting computers have high impacts as well

Chips Material Intensity
(850:1)

Is the Moore Law Sustainable?

IT Power Consumption
vs "Green IT"

Can IT Applications Contribute to Global Sustainability?

Trashware vs e-Waste
Ethical schools / approaches
Ethical Theories / Right or Wrong?

Main schools

Baruch Spinoza (Netherlands, 1632 - 1677)

Relativism

• There are no universal norms
• Merely points to variety of behaviors in different cultures
• The issue of right or wrong is all relative
• Descriptive, not normative

Ethica, 1677
Ethical Theories / Right or Wrong?

Main schools

Immanuel Kant (Prussia, 1724 - 1804)

Deontologism (Kantianism)

• An action is right or wrong in itself
• Stress the intrinsic character of an act and disregard motives or consequences
• Tend to focus on individuals and their rights
• People should be treated as ends and never merely as means
• Focus on the individual

"Kritik der reinen Vernunft", I.Kant, 1781
Utilitarianism (Consequentialism)

- An action is right or wrong depending upon its consequences and effects on society
- Everyone should behave in such a way as to bring about the greatest happiness to the greatest number of people
- Happiness is the ultimate goal of humans
- All actions must be evaluated on the basis of whether they increase or decrease human happiness
- Tend to look at the overall impact on society
- Focus on the society

"On Liberty", J.S. Mill, Ticknor and Fields, Boston, 1863
Utilitarianism / Consequentialism

<table>
<thead>
<tr>
<th>Stakeholders</th>
<th>SC1</th>
<th>SC2</th>
<th>SC3</th>
</tr>
</thead>
<tbody>
<tr>
<td>STKH1</td>
<td>-</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>STKH2</td>
<td>4</td>
<td>9</td>
<td>-</td>
</tr>
<tr>
<td>STKH3</td>
<td>5</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td>STKH4</td>
<td>3</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>STKH5</td>
<td>-</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>STKH6</td>
<td>4</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>STKH7</td>
<td>9</td>
<td>3</td>
<td>9</td>
</tr>
</tbody>
</table>

25  27  26

"happiness" in scale 0-10? Not an easy exercise!
Why we need Computer Ethics
Why we need Computer Ethics

Historical roots

"It seemed that when people entered the computer center they left their ethics at the door"
Donn Parker, "Rules of Ethics in Information Processing" in Communications of the ACM, 1968

Early awareness of impending inequities in access to networked Computer Resources
"... whenever a useful new technology is developed, one policy question that should be vigorously pursued is how to make it available to those who cannot afford to buy it themselves ... a purposeful public program might be designed to make the new communication medium serve the disadvantaged rather than compound their disadvantages"

See also
- Walter Maner, Old Dominion University, "Computer Ethics", 1978
- James Moor, Dartmouth College, "What is Computer Ethics", 1985
- Deborah Johnson, "Computer Ethics", Prentice Hall, 1985
- Computer Professionals for Social Responsibility, 1983
- Int.Conf.on Computer Ethics, New Haven Connecticut, 1991
- Computer Ethics in Computer Science Curricula, 1991
Why we need Computer Ethics

Historical roots

• Computer Ethics is the analysis of the nature and social impact of computer technology and the corresponding formulation and justification of policies for the ethical use of such technology ...

• Some ethical situations confront us as individuals and some as a society. Computer Ethics includes consideration of both personal and social policies for the ethical use of computer technology ...

• Much of the important work in computer ethics is devoted to proposing conceptual frameworks for understanding ethical problems involving computer technology ...

• Computer Ethics is a dynamic and complex field of study which considers the relationships among facts, conceptualizations, policies and values with regard to constantly changing computer technology.

• Computer Ethics is not a fixed set of rules which one shellacs and hangs on the wall. Nor is Computer Ethics the rote application of ethical principles to a value-free technology. Computer Ethics requires us to think anew about the nature of computer technology and our values. Although Computer Ethics is a field between science and ethics and depends on them, it is also a discipline in its own right which provides both conceptualizations for understanding and policies for using computer technology.
Why we need Computer Ethics (why not typewriter ethics?)

Level 5: Issues and problems unique to Information Technology (Would NOT have arisen WITHOUT computers; no-satisfactory non-computer analog)

• Uniquely STORED
  20 Nov 1985, BoNY -32B$ due to an overflow (65535+1=65536 1 0000 0000 0000 0000 = 0!), 21 Nov BoNY -23.4B$ x 1 day. Total interest = 5M$. Y2K!

• Uniquely MALLEABLE
  General Purpose Machine, Universally adaptable, Universal Access is a Must. Computers can do anything we can describe in terms of Input, Process, Output

• Uniquely COMPLEX
  Programming = creation of discrete functions of arbitrary (super-human) complexity. Total behavior cannot be described in any compact function. Testing?

• Uniquely FAST
  Buy / Sell commands by the same algorithms at the same time: destabilized market of futures (contract to buy a stock at a set time and price)

• Uniquely CHEAP
  Crazy scheme of "salami": 0,001€, $10^{-3} x 10^5$ accounts (cheap!)= 100€/day x 200days = 20,000€/year. Spamming: 1p/$10^6x10^6p=10p/day x 10€ = 100€/day ...

• Uniquely CLONED
  1st time in history: exact copy. No transfer of possession. (copy + remix!)

• Uniquely DISCRETE
  Continuous systems = tolerance (small changes, small effects); Discrete systems = no tolerance. Continuity does NOT hold for computers. 1 bit changes ...

• Uniquely CODED
  Degradable nature of media. Obsolescence of I/O devices. Evolution of media formats (& encryption?!). No documentation: computers accelerate the tx of information BUT also reverse effect: computers will impede the generational flow of information: will any stored records be readable in the future? Data archeologists?

• Uniquely INTERNETWORKED
  Dawn of cyberspace!

Source: (adapted from) Walter Maner, "Unique Ethical Problems in Information Technology", ETHICOMP95, Leicester, UK.
A Methodology
1. Scenario Description: Analyze a Real Case
2. Identify Stakeholders (Network)
3. Identify Ethical Issues and Analyze them
4. Identify and Evaluate Alternative Scenario(s) or Courses of Action
Steps for Case Analysis
in Computer Ethics

1. Scenario
2. Stakeholders Network

Ethical Analysis

Conceptual Framework

Steps for Case Analysis
in Computer Ethics

1. Scenario
2. Stakeholders Network

Levels of Social Analysis

- Individuals
- Communities
- Organizations
- Cultures
- Institutions
- Nations
- Global

Steps for Case Analysis in Computer Ethics

1. Scenario

2. Stakeholders Network

3. Identify Ethical issues
4. Alternative scenario(s)

• The last step is the most challenging
  – What is right? What is wrong?
  – Can we propose something different?
    • Ethical Reviewers?
    • "Precautionary Principle"?
    • Moratorium?
  – What is the role of computer professionals involved into the case?

• Recommendations for
  – Project teams (Writing a proposal)
  – Universities (Next Generations of Computer Professionals, ...)
  – Organizations (Guidelines, "soft-laws", Code of Ethics, etc.)
  – Public Authorities ("hard-laws", Policy Makers, etc.)
Case Studies

Group exercise and feedback

• Is there something that could be right / wrong with ICT?

• Organize the group in several teams for "role playing":
  – the developers (the techies)
  – the users
  – the policy makers

• Discuss a simple real case (Drones, Aml, DNA DB, Nanobots)
  – the 3 main levels of discussion
    • brainstorming
    • code of ethics ("soft" laws)
    • laws ("hard" laws)
  – the 4 main drivers
    • architecture
    • education
    • market
    • law
Case Study 1

Drones for environmental monitoring / surveillance / attack?

UAV
Unmanned Aerial Vehicles (Drones)
Case Study 2

Ambient Intelligence for human / adaptive tech, monitoring?

Ambient Intelligence (AmI)
- (electronic) environments sensitive and responsive
- recognize humans and adapt the interface / environment to the person
- several devices work in concert to support people in their everyday life activities
- information and intelligence hidden in the network
- the network contains "profiles" of people
- devices are connected and integrated into our environment
- the computer disappears (only the user interface remains perceivable by users)
- technology become
  - always on
  - pervasive
  - embedded (disappearing)
  - personalized (your profile is yours?)
  - adaptive (to your personal needs / capabilities)
  - anticipatory (interpreting your actions)
  - context aware (not always the same behaviour)

- Human-Centric Computing?
- Advanced Interaction Design?
- Surveillance Society?
Case Study 3: National DNA Database

The Next Frontier of Crime "Prevention"
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Stakeholders Network

National DNA DataBase

- Authorized Personnel
- Public Authorities, National Security
- Citizens
- Technology Provider(s)

Citizens

Computer Professionals

Society

Privacy
(VERY sensitive data about us will be collected)

(Un)Reliability
(HOW will the system be tested? WHO will have access to that data? WHAT kind of control will citizens have?)
Bio-Nanobot
Source: C. Mavroidis and A. Dubey
Description: Perhaps the ultimate future of nanotechnology, this image portrays a tiny nanometer sized, fully functioning autonomous robot helping to destroy a faulty red blood cell. Though it may seem a fantasy now, all of the steps we take are steps closer to the goal.
The long term goal of this project is to develop novel and revolutionary biomolecular machine components that can be assembled and form multi-degree of freedom nanodevices that will be able to apply forces and manipulate objects in the nanoworld, transfer information from the nano to the macro world and also be able to travel in the nanoenvironment. These machines are expected to be highly efficient, economical in mass production, work under little supervision and be controllable. The vision is that such ultra-miniature robotic systems and nano-mechanical devices will be the biomolecular electro-mechanical hardware of future manufacturing, biomedical and planetary applications. Some proteins, due to their structural characteristics and physicochemical properties constitute potential candidates for this role.
Case Study 4: NanoBots

The Next Frontier of "Medicine"

Stakeholders Network

NanoBots

Doctors

Patients

Public Authorities, FDA, etc.

Society

Nano-"manufacturing"

Nano-"programmers"

Nano-"scientists / researchers"

The Environment

Privacy
(there will be something around and inside us collecting information about us)

Crimes
(who will be in charge for controlling the "little toys"?)

(Un)Reliability
(what kind of decisions/rules in the software? how will we test nanobots?)

AI
(longevity, "retiring" nanobots? "Pandora Jar" Effect?)
"Technology is driving the future, the steering is up to us"

Computer Professionals for Social Responsibility
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Thank you for your time and attention