AI ETHICS

Gordana Dodig-Crnkovic
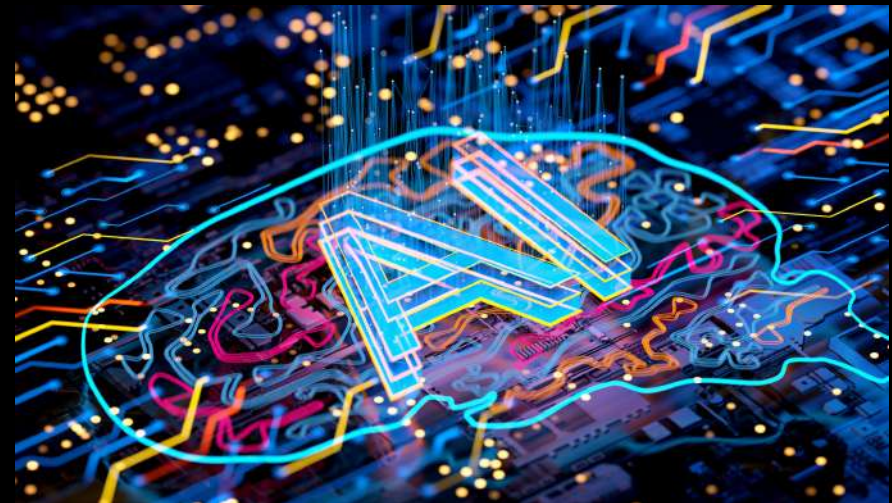
Mälardalen University, Västerås, Sweden

Chalmers University of Technology, Gothenburg

Västerås, February 26th 2024

EDISS Winter School 2024

Erasmus Mundus Joint Master Degree Programme

on the Engineering of Data-intensive Intelligent Software Systems

http://www.idt.mdh.se/~gdc/

https://www.chalmers.se/en/staff/Pages/gordana-dodig-crnkovic.asp

Ethical Issues that my students identified

Data-related

- *Data provenance (attribution, background)*
- Data confidentiality
- Data privacy
- Public understanding of technology and protection of private data
- Data quality, property and equality
- Data-driven approaches
- Reproducibility of real time datasets
- Data is never "neutral"
- Data collection influences behavior
- Data-streching used in political purpose
- security and reliability of the IoT devices
- "Surplus data" from screening of patients that can reveal much more
- Transparency vs. quality

Sustainability-related

- Fuel economy, lower emissions, reduced take-off and landing noise
- Environmental contributions of battery production, use and disposal
- Environmental impact of massive electronic production
- Increasing demand of rare elements
- **Lack of life cycle assessment**
- **Rebound effect**
- Digital sustainability?

Ethical Issues

Methodology Aspects

- Values
- The method
- Epistemic problems related work - acknowledging its limitations
- Reducing reality into a model, with loss of depth and variety of perspectives?
- Marginalizing the designer in the design process?
- Level of transparency is acceptable for an automated tool?
- Should we rely on automated tools if we consider the intrinsic limits of the learning process?
- Data-driven development methodology
- genetic discrimination
- genetic modification/engineering
- Tradeoff between safety and innovation

- OPEN SCIENCE
- Simulation compared to real experiments
- Making a connection between qualitative and quantitative information
- Application of the complex system in Landscape studies
- Reproducibility
- The system's performance is almost always evaluated in isolation [QUESTION OF INTERPRETATION OF RESEARCH RESULTS]
- Authors do not verify their results thoroughly enough, or they hide complications
- THE REVIEW PROCESS IS NOT DOUBLE-BLIND
- Presentation of results (overemphasizing their importance)
- Value of an intervention compared to other applications

Ethical Issues

Social Aspects

- Cultural diversity
- Professional conduct
- Gender equality
- Quality of life
- Impact of technology on society at large
- Is the purpose of the analysis relevant enough to expose the users to privacy loss?
- Designing technology that could reduce the need for human employees?
- Entrusting the machine to define culturally relevant spaces for our cities?
- Legal issues related to copyright infringement
- Involving stakeholders/users
- Trust between stakeholders?

- Professional societies/organisations and Codes of Ethics
- Popular presentation of research and public opinion about research
- Informing the politics about possibilities and challenges of research

Topics that Interest me Currently
Ethics of AI & Robotics

Generative AI ethics – some concerns

Distribution of harmful content
Copyright and legal issues
Data privacy violations
Sensitive information disclosure
Amplification and perpetuation of the existing bias
Workforce issues
Data provenance
Lacl of explainability and interpretability

https://citp.princeton.edu/event/ai-and-ethics/

https://www.techtarget.com/searchenterpriseai/tip/Generative-AI-ethics-8-biggest-concerns

Ethics in Autonomous Cars

Decisioon making by algorithms

Bias and Gender Issues in ICT

Women Vastly Underrepresented In Silicon Valley Tech Jobs
% of female employees in the workforce of tech companies
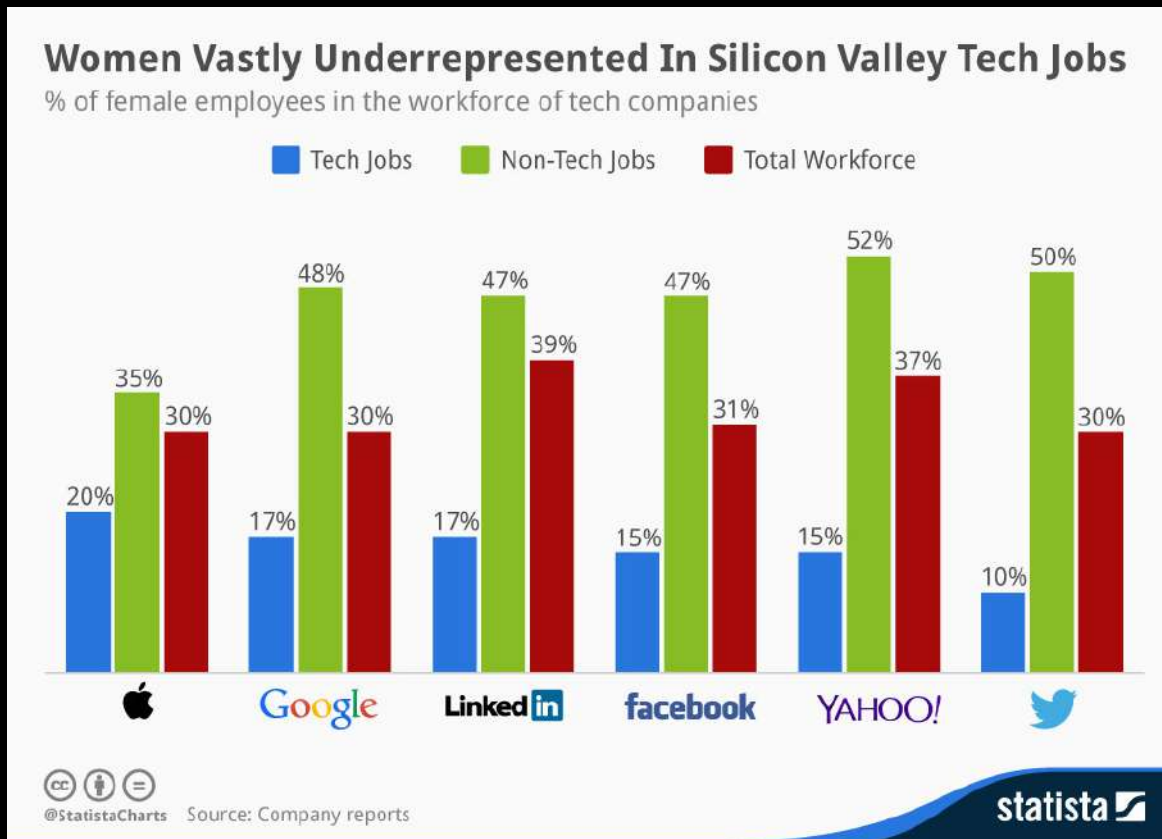
EUGAIN project European Network For Gender Balance in Informatics
https://eugain.eu/

Ethical Issues Move Technology Forward

Klimat och säkerhet driver på teknikfrågorna

VALET 2018. Teknikfrågorna står på en del områden mitt i den politiska debatten inför årets val. Ny Teknik har ställt 14 frågor till riksdagspartierna.

LÄS MER

Debatten om flyget tar ny fart

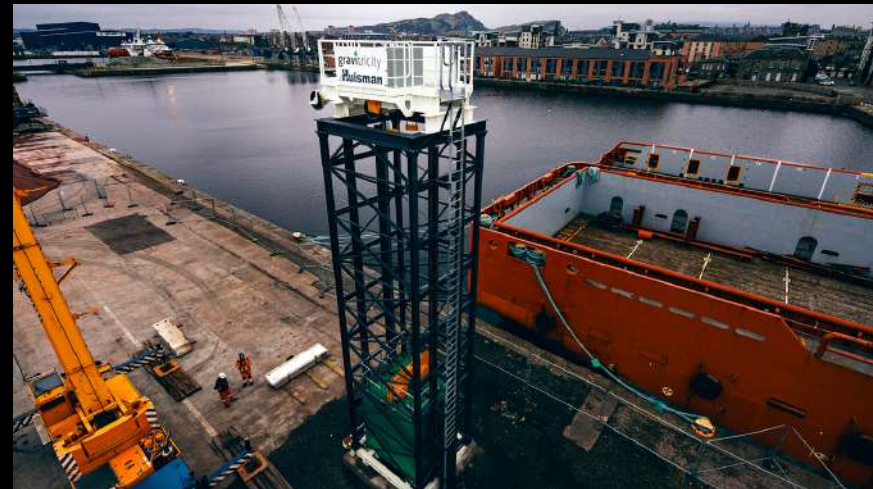VALET 2018. Miljöpartiet vill inte bara behålla flygskatten, utan även höja den.

LÄS MER

Hållbart och underhållsfritt – därför väljer Linder betong för sina lokaler

ANNONS. "Betong har många fördelar, det är ett bestående material och det kräver inget underhåll."

Gravity battery in the news today

Gravity battery in the design ethics
https://vimeo.com/235547814 Ethics for design

CACM, Emergent Technologies, Ethics and Society

- INFORMATICS EUROPE AND ACM EUROPE COUNCIL Regulating Automated Decision Making
- CERF'S UP Traceability -workshop on cybersecurity was how to preserve the freedom and openness of the Internet while protecting against the harmful behaviors
- LETTERS TO THE EDITOR Encourage ACM to Address U.S. Election Integrity
- In the spirit of Moshe Y. Vardi's call for ACM to ". . . be more active in addressing social responsibility issues raised by computing technology," we urge the ACM U.S. Public Policy Council to undertake a study of the technological …CACM Staff
- BLOG@CACM Assessing Responsibility for Program Output
- We lack an easy way to indicate that algorithms do not make decisions and are not biased; programmers do, and are. Robin K. Hill
- Animals Teach Robots to Find Their Way
- Navigation research demonstrates bio-machine symbiosis. Chris Edwards
  Electronics Are Leaving the Plane Stacking chips and connecting them vertically
- Broadening the Path for Women in STEM - Organizations work to address 'a notable absence of women in the field.'Esther Shein
- GLOBAL COMPUTING Designing Sustainable Rural Infrastructure Through the Lens of OpenCellular
- EDUCATION Providing Equitable Access to Computing Education
- Seeking the best measures to reach advantaged and less-advantaged students equally. Mark Guzdial, Amy Bruckman
- COLUMN: KODE VICIOUS Every Silver Lining Has a Cloud

https://cacm.acm.org/magazines/2018/8

Ethics high on the agenda: Example CACM 2023 05

- <u>ACM for the Public Good</u>

The ACM 4.0 Initiative aims to lay the foundations of ACM for the next 25 years on issues of service to society and to ACM members, ACM membership, ACM finances, and internal processes. *Moshe Y. Vardi*

- <u>A Career Built on Using Technology to Help Others</u>

Everyone deserves the access and opportunity to have a good and fulfilling life. Technologies can only contribute toward this goal when they are designed from an understanding of what makes a life good for the people concerned … *Jules Maitland*

- <u>Women in Computer Science Are Making Strides</u>

Computer science is still not a level playing field for those women who majored in it and choose to pursue it as a career. *Esther Shein*

- <u>Do the Right Thing</u>

Exploring the intersection of legal compliance and ethical judgment. *Kendra Albert, James Grimmelmann*

- <u>Updates, Threats, and Risk Management</u>

Revisiting a recent column considering security updates. *Steve Lipner, John Pescatore*

- <u>Ethics as a Participatory and Iterative Process</u>

Facilitating ethical reflection, inquiry, and deliberation. *Marc Steen*

- <u>NSF on Chien's Grand Challenge for Sustainability</u>

This Viewpoint focuses on ways the computing community can contribute broadly to environmental sustainability and identifies NSF Directorate for Computer and Information Science and Engineering research programs supporting these … *Nina Amla, Dilma Da Silva, Michael Littman, Manish Parashar*

- <u>ChatGPT, Can You Tell Me a Story?</u>

An exercise in challenging the true creativity of generative AI. *Ralph Raiola*

<u>https://cacm.acm.org/magazines/2023/5</u>

Why I do not talk about Ethical dilemmas

Naming decision situations dilemmas underlines the impossibility to find an ideal (perfect, unique and provable) solution.

However, engineering is requires decision making in the real world where the solution is the best available solution under given circumstances.

Ethics is a huge field
What this lecture can do is open the window with a view

Basic Introduction to Ethics

Facing Grand Challenges

"The global community is facing **Grand Challenges**. The European Knowledge Society must tackle these through the best analysis, powerful actions and increased resources. Challenges must turn into sustainable solutions (…) " The Lund Declaration, 2009 [1]

Natural challenges: Global warming, Insufficient supplies of energy, water and food, Ageing societies, Public health, pandemics, Security, Environmental degradation

Unintended consequences of technology: AGI (artificial general intelligence), Nano-technology, Biotechnology/Bioinformatics, Autonomous machinery and control: Big data, Internet of things – internet of everything, Intelligent cities, Autonomous cars, Autonomous intelligent software as control physical systems, information systems etc.

 …

The Centre for the Study of Existential Risk (University of Cambridge; http://cser.org

Education of new generations of engineers often focus on training abstract skills without careful consideration of the role of embeddedness of technology into context.

Future Intelligent Autonomous Systems

The IEEE Global Initiative for Ethical Considerations in Artificial Intelligence and Autonomous Systems

http://standards.ieee.org/develop/indconn/ec/autonomous_systems.html

Prioritizing human well being in the age of artificial intelligence: https://youtu.be/z5yZU8tp9W8 (5:56)

Responsible Research and Innovation

Global challenges and opportunities prompted
Responsible Research and Innovation (RRI), defined as:

"a transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view to 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 Schomberg

Education of future engineers should follow!

Facing Grand Challenges:
The University of the Future

The transformation of "ivory tower" context-independent to socially-aware paradigm in increasingly information-rich knowledge-based societies.

The triple helix model connects:
–ACADEMIC
–INDUSTRY/BUSINESS
–GOVERMENT

University   Business   Government

Inspired by biology: THE TRIPLE HELIX
Gene, Organism, and Environment by Richard Lewontin

https://inquiryumn.files.wordpress.com/2014/09/triple-helix.png

Science with and for Society
Work Programme

Societal challenges as formulated in the Science with and for Society work program, are meant to

 "help build effective cooperation between science and society, to recruit new talent for science and to pair scientific excellence with social awareness and responsibility"

This new approach encourages all stakeholders (involved citizens, researchers, business, policy makers, etc.) to interact throughout the research and innovation process and to coordinate and align both the process and its outcomes with societal values and needs, in accordance with Responsible Research and Innovation (RRI).

Societal values and needs: sustainability, safety, privacy, equity, diversity, etc.

https://ec.europa.eu/programmes/horizon2020/en/h2020-section/science-and-society

Organizational Adaptation in the Era of Complexity and Continuous Change

A necessity of defining social/organizational responsibility in addition to customary personal responsibility [7].

We should take into account both intended and unintended consequences of research and technology in a preferably *anticipatory and learning process* that will in the first place prevent incidents and accidents and in the worst case *mitigate* their consequences, [8-13].

Contemporary global society is organized in networks of networks of interacting agents. Each individual belongs to a variety of networks, which define their different roles as stakeholders in various aspects of research and technology. In this context complexity and trans-disciplinarity /inter-disciplinarity comes as an important aspect of research and development.

Values, priorities, actions are negotiated by stakeholders, globally.

Educating Engineers for the Future

We are educating engineers that will solve future problems

Future is already at our doors: it comes in form of digitalisation that is going to radically change our technology and society

Choices are made all the time in the design and engineering and sensitivity to consequences of choices is needed – involves moral judgment.

Terminological Clarification: Ethics and Morality

The terms ethics and morality are often used interchangeably - indeed, they usually can mean the same thing, and in everyday conversation there isn't a problem with switching between one and the other.

However, there is a distinction between them in philosophy!

Ethics and Morality, Etymology

Morality and ethics have the same roots, *mores* which means manner and customs from the Latin and *etos* which means custom and habits from the Greek. (Robert Louden, Morality and Moral Theory)

Strictly speaking, morality is used to refer to what we would call *moral conduct* while ethics is used to refer to the *formal study of moral conduct*.

Ethics is also often called *moral philosophy*.

Ethics and Morality, in Short

- MORALITY - PRACTICE: first-order set of beliefs and practices about how to live a good life.

- ETHICS - THEORY: a second-order, conscious reflection on the adequacy of our moral beliefs.

In a presentation at Chalmers in October 2015, ethicist Prof. Ibo van de Poel from TU Delft in the Netherlands suggested that the students need to develop the following "moral competences":

- Moral sensibility
- Moral analysis skills
- Moral creativity
- Moral judgment skills
- Moral decision-making skills
- Moral argumentation skills

Societal Normative Systems
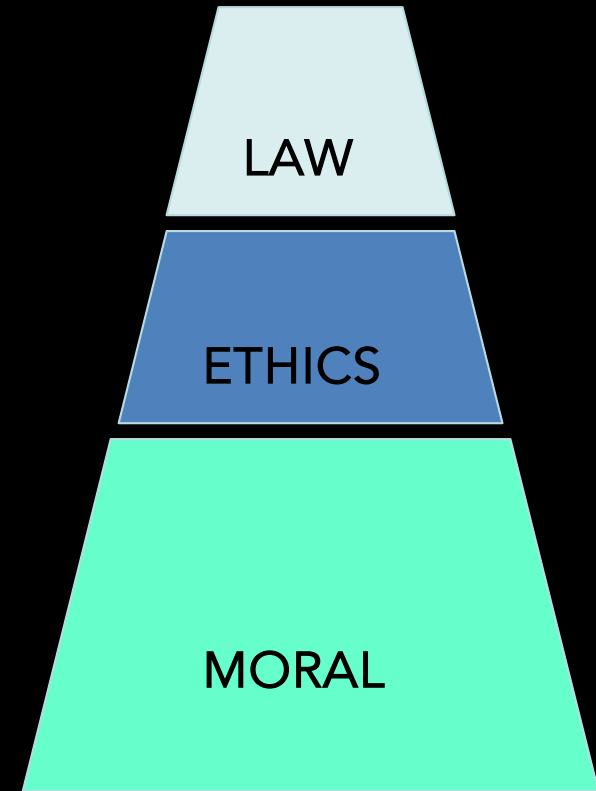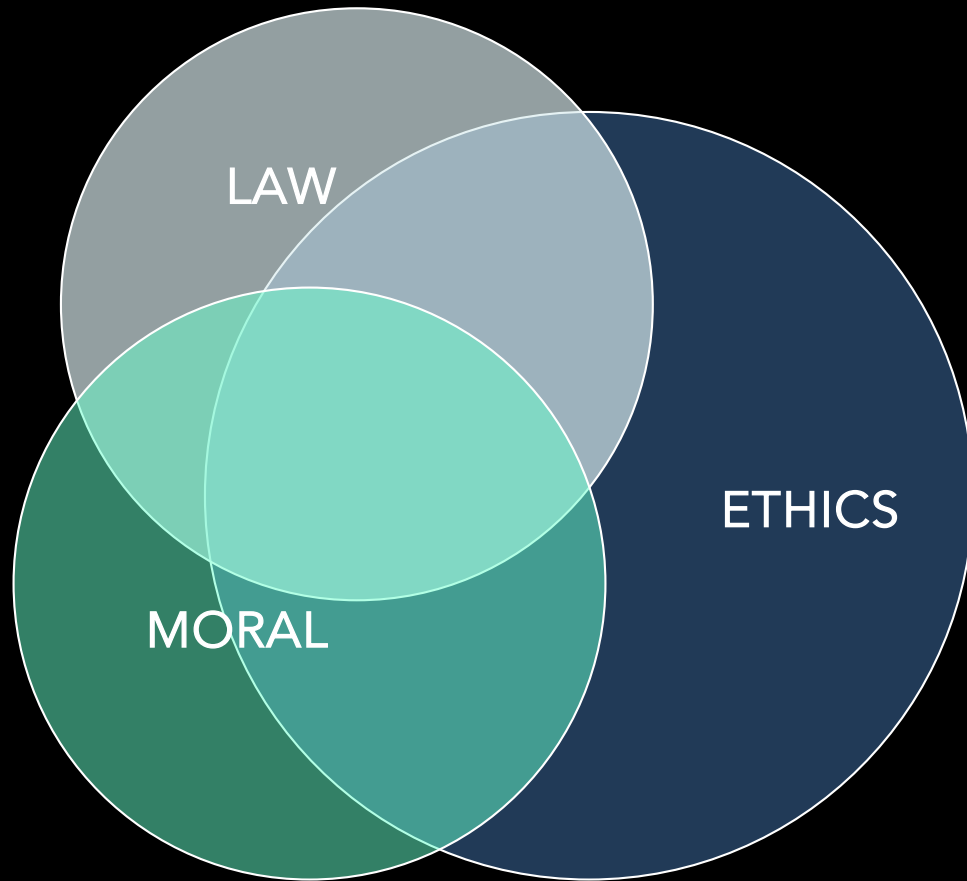
Ethics as Continuum
- An Ongoing Conversation

- World changes constantly, and we have to interpret/construe it over and over again.

- We come back to ideas again and again, finding new meaning in them.

- Professional discussions of ethical issues in journals.

See http://www.utm.edu/research/iep/e/ethics.htm Ethics

What to Expect from Ethics

Functions of theory:

- Describe (What?)
- Explain (Why?)
- Prescribe (How?)
- Support (Yes, we can!)
    - Open new possibilities and insights
    - Wonder – move on exploring ethical aspects

On what Ethical Basis do People Typically Make Moral Decisions?

– Divine Command Theories

– Utilitarianism (Consequentialism)
  The action is best, which procures the greatest happiness for the greatest number…

– Virtue Ethics
  Maximize virtue, minimize vices

On what Ethical Basis do People Make Moral Decisions?

- **The Ethics of Duty** (Deontological* Ethics)

    - Immanuel Kant's Moral Theory. The categorical imperative: -- "Act so that the maxim [determining motive of the will] may be capable of becoming a universal law for all rational beings."

- Ethical Egoism

    - Ayn Rand, The Ethics of Selfishness

        Well known for her novels, especially, Atlas Shrugged

    - "Macciavelism" – "The end justifies the means" Nicollo Macchiavelli (The Prince) - rationalization of war

* 'deon' = duty

On what Ethical Basis do People Make Moral Decisions?

- **The Ethics of Natural and Human Rights** – all people are created …with certain basic rights
- **Social Contract Ethics** (We agree to be civil to one another under threat of punishment from a government established for this purpose. [Plato, Republic. Thomas Hobbes])
- **Evolutionary Ethics** – Being social increases our chances to survive

POLICY VACUUMS – ETHICS OF PRESENT-DAY TECHNOLOGY AND DEVELOPING SOCIETY – EXAMPLE OF COMPUTER ETHICS

"A typical problem in computer ethics arises because there is a policy vacuum about how computer technology should be used. Computers provide us with new capabilities and these in turn give us new choices for action. Often, either no policies for conduct in these situations exist or existing policies seem inadequate. A central task of computer ethics is to determine what we should do in such cases, i.e., to formulate policies to guide our actions. Of course, 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."

Moor, J, 1985. "What is Computer Ethics", Metaphilosophy 16(4): 266-75.http://www.cs.ucdavis.edu/~rogaway/classes/188/spring06/papers/moor.html

VALUES AND ETHICS

The Question of Values

Too often, new technology develops with little attention to its impact upon human values
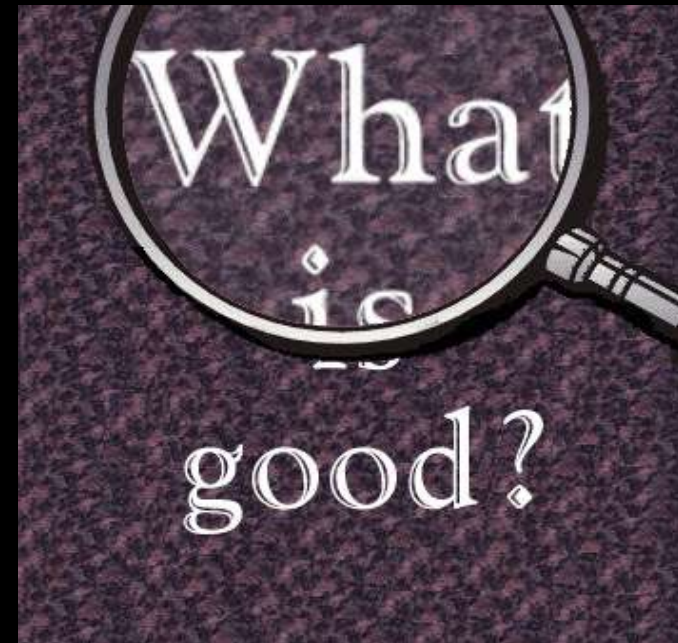
VALUES AND ETHICS IN KNOWLEDGE PRODUCTION

Based on the article:

Nancy Tuana (2015)
Coupled Ethical-Epistemic Analysis in Teaching Ethics. Critical reflection on value choices.
CACM VOL. 500 NO. 12. Pages 27-29

http://cacm.acm.org/magazines/2015/12/194630-coupled-ethical-epistemic-analysis-in-teaching-ethics/abstract

ETHICAL-EPISTEMIC* ANALYSIS
## How values and priorities affect knowledge production

"Computer experts aren't just building and manipulating hardware, software, and code, they are building systems that help to achieve important social functions, systems that constitute social arrangements, relationships, institutions. computer experts can facilitate and constrain behavior, and materialize social *values*."

Deborah Johnson

Values serve as a guide to action and knowledge.

Epistemology-the branch of philosophy concerned with the nature and scope of knowledge.

Values in Knowledge Production

KNOWLEDGE

VALUES   VALUES

SCIENCE

INFORMATION

VALUES   VALUES

DATA
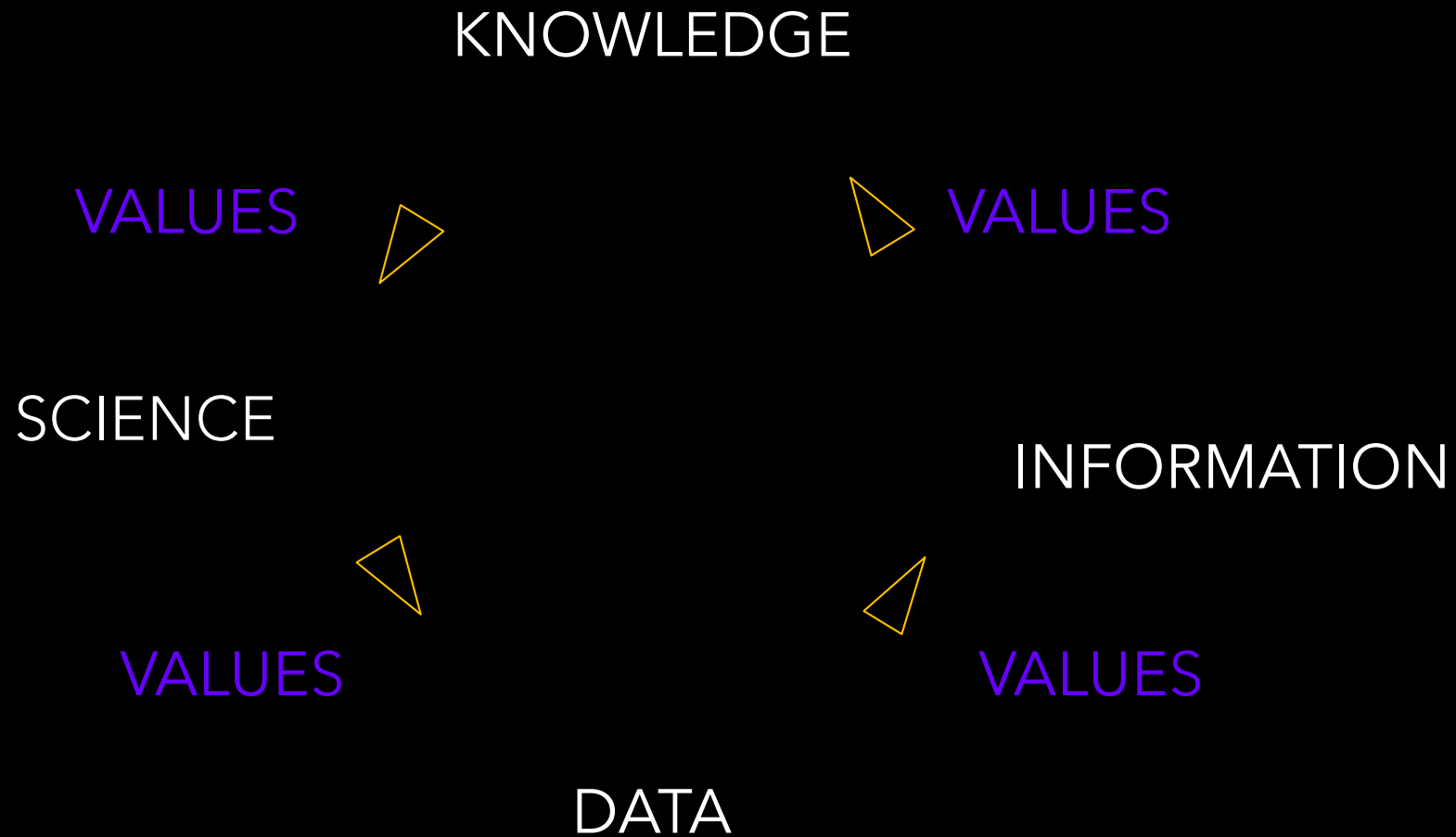
VALUES

Values serve as a guide to action and knowledge. They are relevant to all aspects of scientific and engineering practice, including discovery, analysis, and application.

Cognitive scientists have found v a l u e s to be integral parts of STEM (Science, Technology, Engineering, and Mathematics) research.

TYPES OF VALUES

Various types of values can be involved in decision-making and reasoning, some examples:

- ethical values (the good of society, equity, sustainability)
- *aesthetic* values (simplicity, elegance, complexity), or
- *epistemic* values (predictive power, reliability, coherence, scope).
- *economic* values, etc.

Code of Conduct for Research Integrity Basic Principles - Values

Reliability in ensuring the quality of research, reflected in the design, the methodology, the analysis and the use of resources.

Honesty in developing, undertaking, reviewing, reporting and communicating research in a transparent, fair, full and unbiased way.

Respect for colleagues, research participants, society, ecosystems, cultural heritage and the environment.

Accountability for the research from idea to publication, for its management and organisation, for training, supervision and mentoring, and for its wider impacts

The European Science Foundations Code of Conduct for Research Integrity
https://ec.europa.eu/research/participants/data/ref/h2020/other/hi/h2020-ethics_code-of-conduct_en.pdf

Values Related to Risks

- Reliability
- Safety
- Security
- Privacy
- Human well-being

Book: **Computer-Related Risks** by Peter Neumann (Addison-Wesley 1994; ACM Press Series)

VALUES IN RESEARCH – CHOICES WE MAKE

- The selection of research topics. What is a good basis for
(We get involved with existing research. Or we get funding for a specific research. Or we choose freely. Why is this research worth our time and effort?)

- Choice of approach, methodology, tools. What are the values of a model, hypothesis, or theoretical explanation in providing convincing explanation?

- Judgment of the support for a research result. What values of evidence constitute robust evidence?

- How are ethical aspects of research taken care of?

REQUIREMENT FOR TRANSPARENCY OF VALUES

Transparency of values is essential for trustworthiness and credibility of research. It is central to transdisciplinary research such as e.g. the National Science Foundation's Sustainability Research Network on Sustainable Climate Risk Management (SCRiM, http://scrimhub.org).

Coupled ethical-epistemic analysis helps to identify new and refined research topics, and inform modeling for multi-objective, robust decision making.

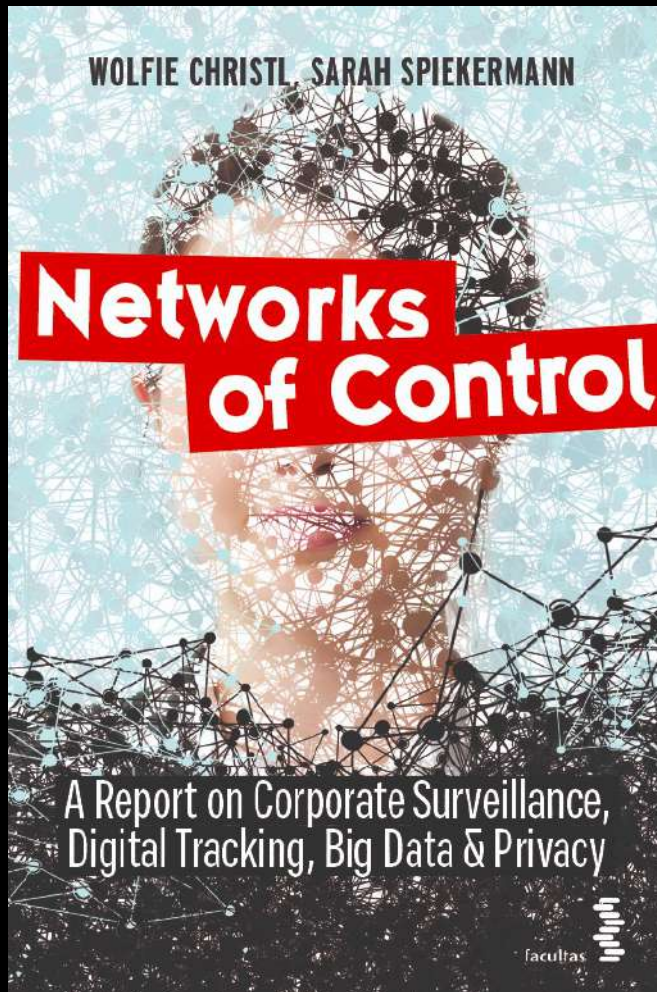# Ethical IT Innovation: A Value-Based System Design Approach
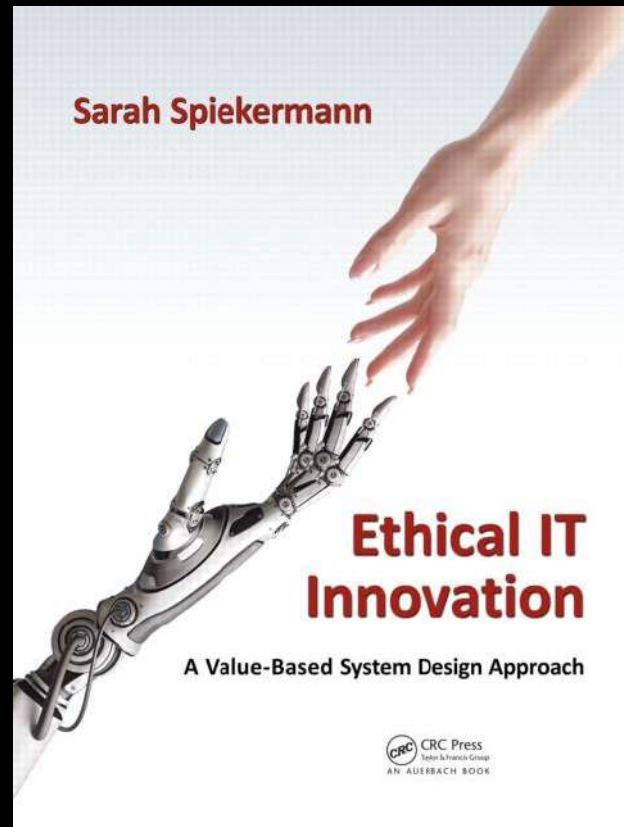
Sarah Spiekermann

Sarah Spiekermann:

IEEE P7000
The first global standard process for addressing ethical concerns in system design

Ethical IT Innovation
A Value-Based System Design Approach

CRC Press
Taylor & Francis Group
AN AUERBACH BOOK

https://www.crcpress.com/Ethical-IT-Innovation-A-Value-Based-System-Design-Approach/Spiekermann/p/book/9781482226355#googlePreviewContainer

Networks of Control

Wolfie Christl and Sarah Spiekermann (2016)
Networks of Control. A Report on Corporate
Surveillance, Digital Tracking, Big Data & Privacy.

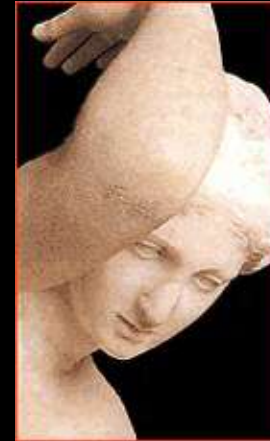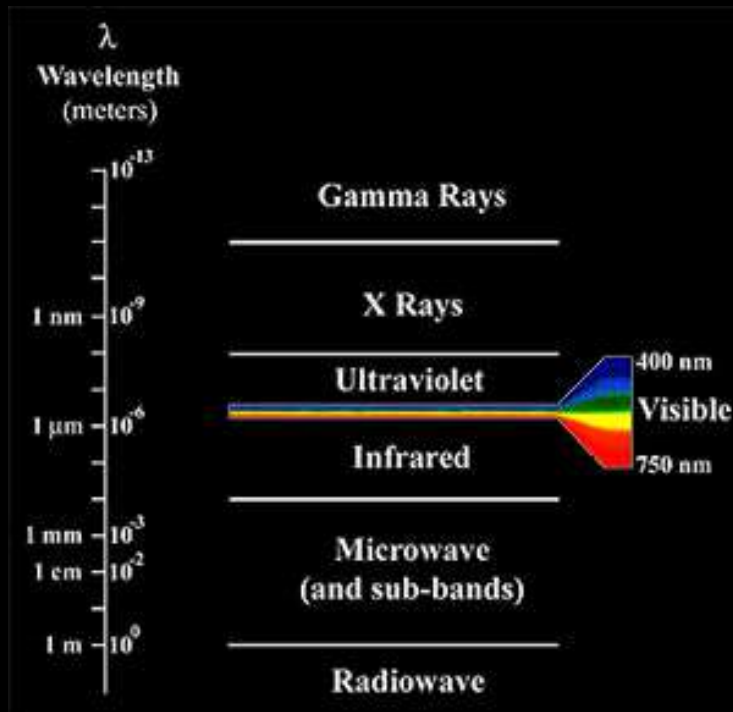Facultas, Vienna

ISBN 978-3-7089-1473-2

http://crackedlabs.org/dl/NetworksOfControl_PressInfoEN.pdf

Sarah Spiekermann and Lorrie Faith Cranor
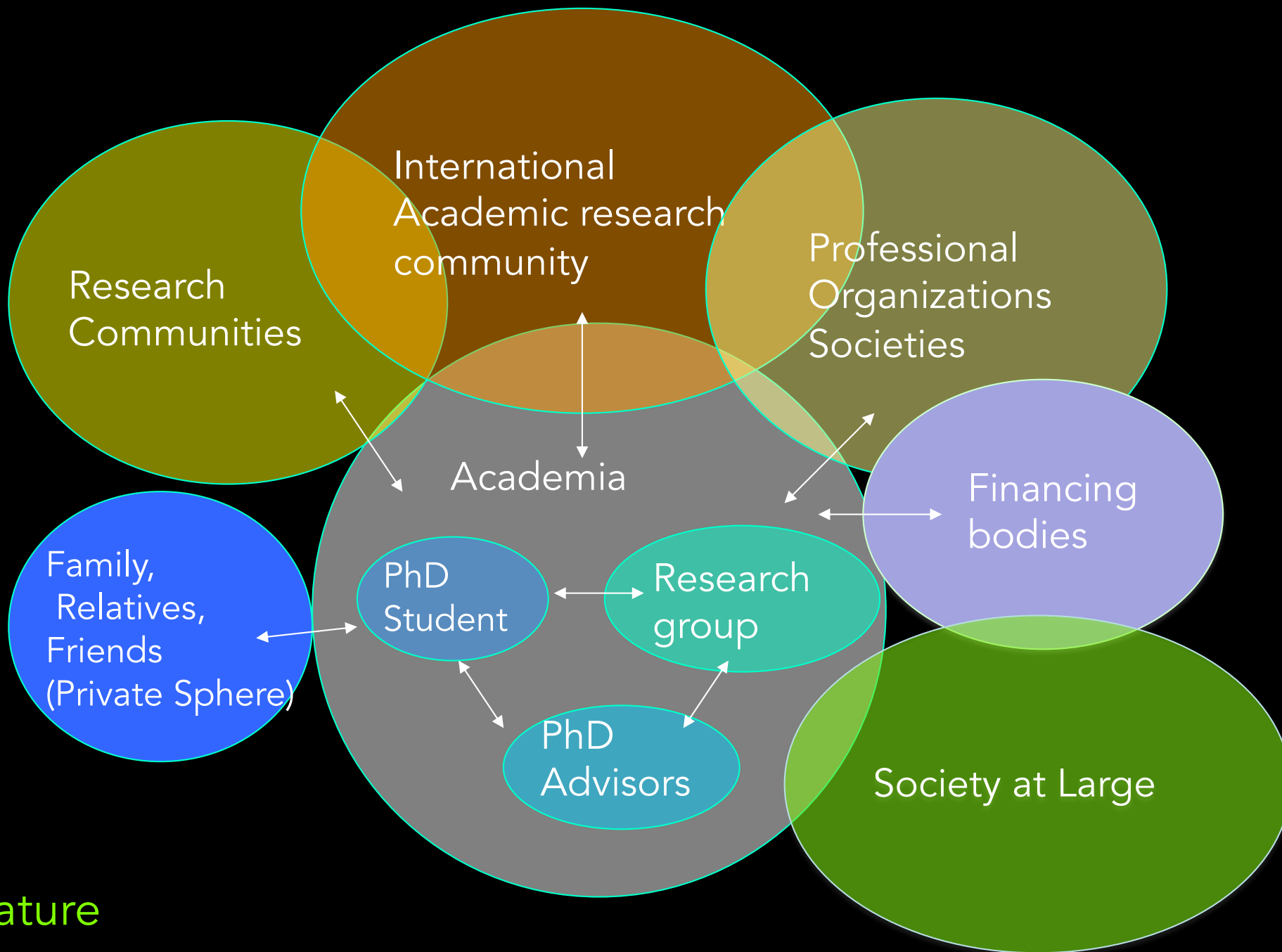(2009) **Engineering Privacy**

https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=4657365

IEEE Transactions On Software Engineering, Vol.
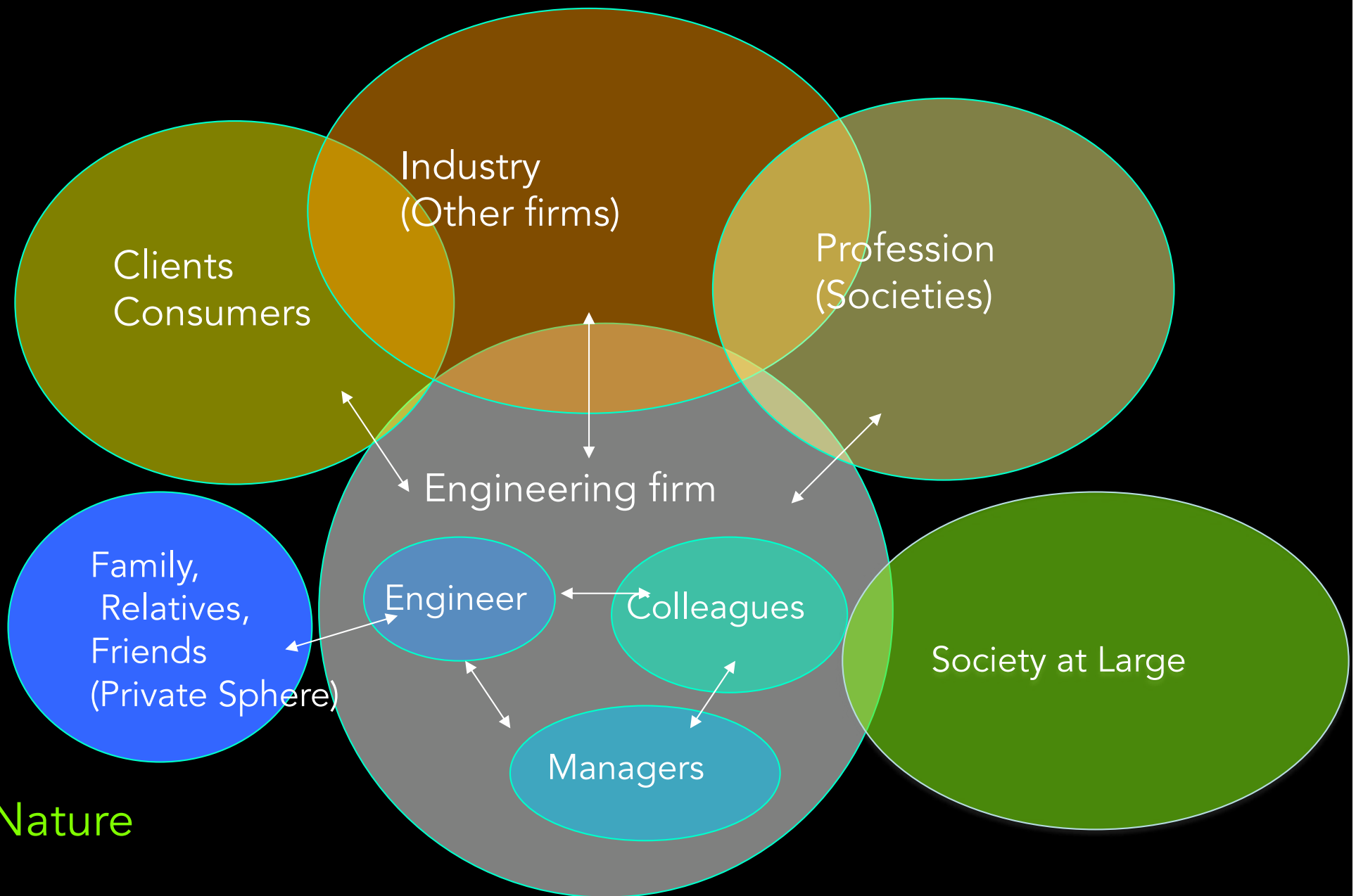35, No. 1, January/February 2009

World seen in different light

What if we could see in any wavelength of the electromagnetic spectrum, from gamma-rays to radio waves? How would the world appear to us?
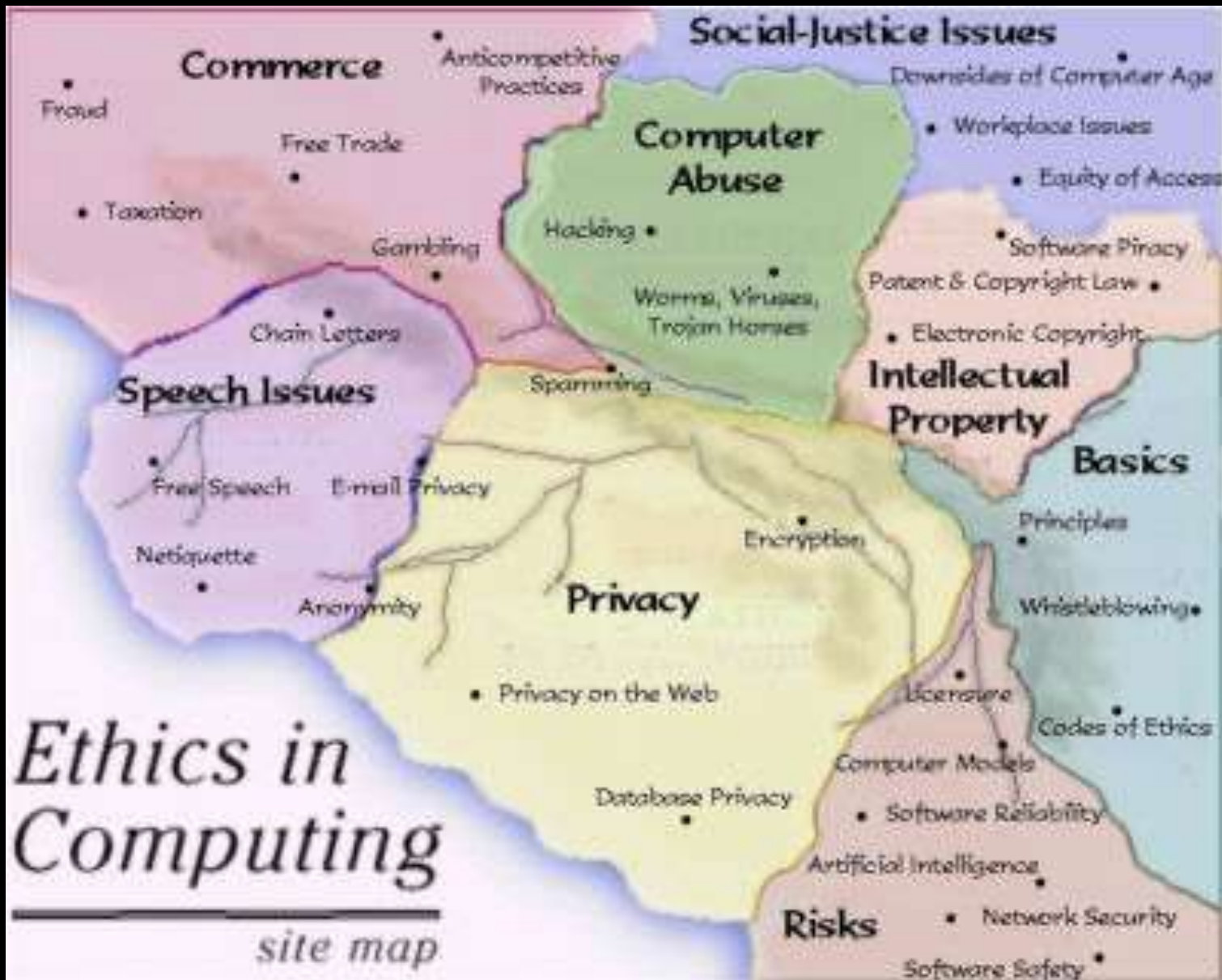
ETHICS AND HUMAN RELATIONS –
THE ROLE OF STAKEHOLDERS

STAKEHOLDERS IN AN ACADEMIC RESEARCH PROJECT

STAKEHOLDERS IN AN INDUSTRIAL RESEARCH PROJECT

Industry
(Other firms)

Clients
Consumers

Profession
(Societies)

Engineering firm

Family,
Relatives,
Friends
(Private Sphere)

Engineer

Colleagues

Society at Large

Managers

Nature

Ethics in Computing
site map

http://legacy.eos.ncsu.edu/eos/info/computer_ethics/