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ETHICAL REFLECTIONS on the Workforce for the Digital Transformation

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Professor of Interaction Design at Chalmers University of Technology

Web pages:

<http://gordana.se/> Personal

<http://www.gordana.se/work/presentations.html>

Chalmers University of Technology

<https://www.chalmers.se/en/staff/Pages/gordana-dodig-crnkovic.aspx>

Mälardalen University

http://www.es.mdh.se/staff/37-Gordana_Dodig_Crnkovic

TOPICS OF REFLECTIONS

- Grand challenges of the future and ethics
- Approaches to ethics from different perspectives
- Importance of Value systems
- My experiences from teaching ethics – quick pointer to courses, teaching methods, and results
- Stakeholders involvement
- Ethics in research
- Summary of reflections

Workforce for the Digital Transformation

- **Today's** workforce

Ethical reflection in technology is a new phenomenon.

In the classical era with slowly developing technologies, there was no sense of **urgency** for the solution of ethical problems caused by technology.

Today's workforce within the technology sector has typically no education in the ethics of technology. Example of new development: Ethics course for teachers in CS at Mälardalen University (follow up of ETHICS4EU project).

- **Future** workforce

Students in technology and especially informatics (computing) are more and more exposed to public debates about emerging technologies (such as AI, nano, robotics, ubiquitous computing, etc.) and often have either dedicated lectures or courses in ethics of computing/informatics. Example of new development: Ethics4EU

FACING GRAND CHALLENGES OF THE FUTURE THROUGH DIGITAL TRANSFORMATION

Facing grand challenges

Natural challenges: Global warming, Insufficient supplies of energy, water, and food, Aging 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 focuses on training abstract skills without careful consideration of the role of embeddedness of technology into context.

Facing grand challenges: The university of the future

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

The **triple helix model** connects:

- ACADEMIC
- INDUSTRY/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>

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 digitalization that is going to radically change our technology and society

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

APPROACHES TO ETHICS

Ethics is an old field meeting a new world with its policy gaps

One side of the coin: Prominent professionals within informatics identify ethical problems with emerging technologies

PROFESSIONALS ARE THE ONLY PEOPLE WHO KNOW EXACTLY WHAT IS IN THOSE BLACK BOXES

	Event Type:	Seminar
Speaker:	Title:	IDT Open Seminar: Can we build trustworthy and trusted on-line voting systems?
Paul Gibson, Telecom Sud Paris	Date:	Oct 18, 2022 13:15
	Location:	Ypsilon
	Contact person:	Radu Dobrin

Ethics is an old field meeting a new world with policy gaps

The other side of the coin: Ethics is a very old field. Professional ethicists have a toolbox for ethical analysis that we should know about.



Mireille Hildebrandt, FBA
@mireillemoret



And one could also say, I beg you, if you work on the Ethics of AI, learn something about ethics. Too many folk are reinventing the ethics wheel, as if a degree in CS makes one an expert in whatever. Luckily we have great people who are good in both, or willing to learn



Timnit Gebru  @timnitGebru · 10h

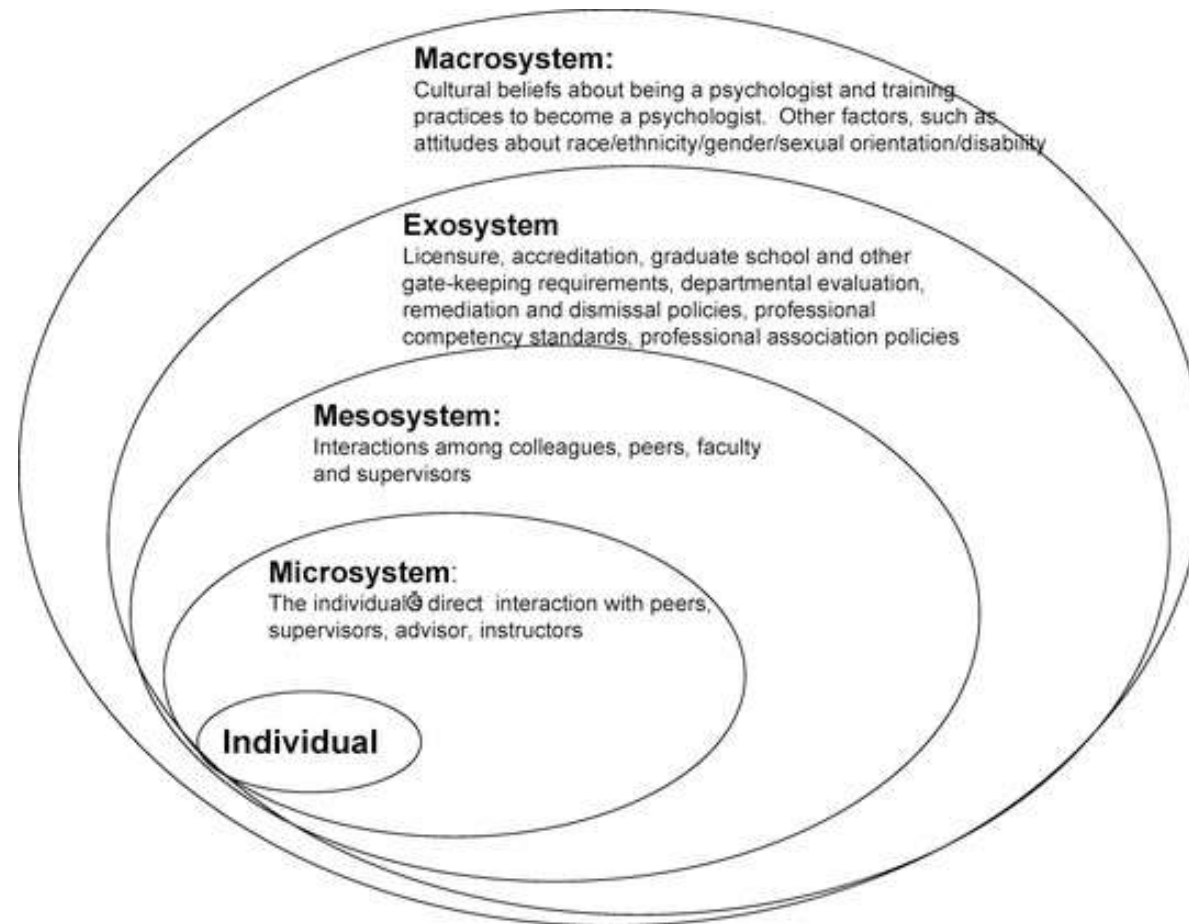
I have my PhD in "AI" & spent my career in tech as an engineer & then researcher. The skills required to understand how a system harms society aren't the same as those required to build it.

Ppl don't need to know how face recognition works to know that it harms them.
[twitter.com/scottjshapiro/...](https://twitter.com/scottjshapiro/)

[Show this thread](#)

ETHICS PERSPECTIVES AND LEVELS OF ANALYSIS

Micro – Meso – Exo – Macro – Views of Ethics

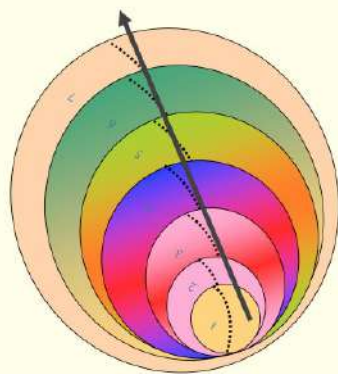


You will recognize this **domain-based** view in the analysis of many different types of problems – organization of society, sustainability of cities, ecology, economics, ethical aspects etc.

Source: American Psychological Association website

Complexity aspects relating Micro – Meso – Exo – Macro levels of analysis – example of a city

Map 2: The Nested Hierarchy of City Systems

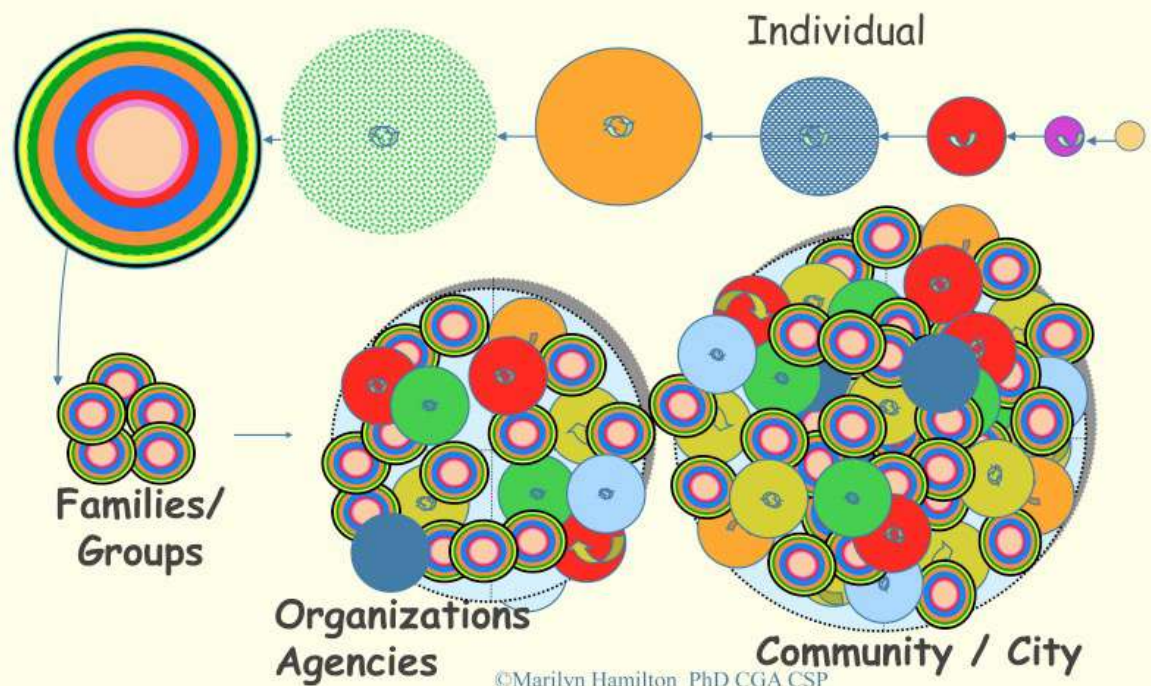


- 1 = individual
- 2 = family/clan
- 3 = group/tribe
- 4 = organizations: workplaces, education, healthcare
- 5 = community(s)
- 6 = city
- 7 = world

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A holarchy, in the terminology of Arthur Koestler, is a connection between holons, where a holon is both a part and a whole. The term was coined in Koestler's 1967 book *The Ghost in the Machine*.

Map 3: The Scalar Fractal Relationship of Micro, Meso, and Macro Human Systems



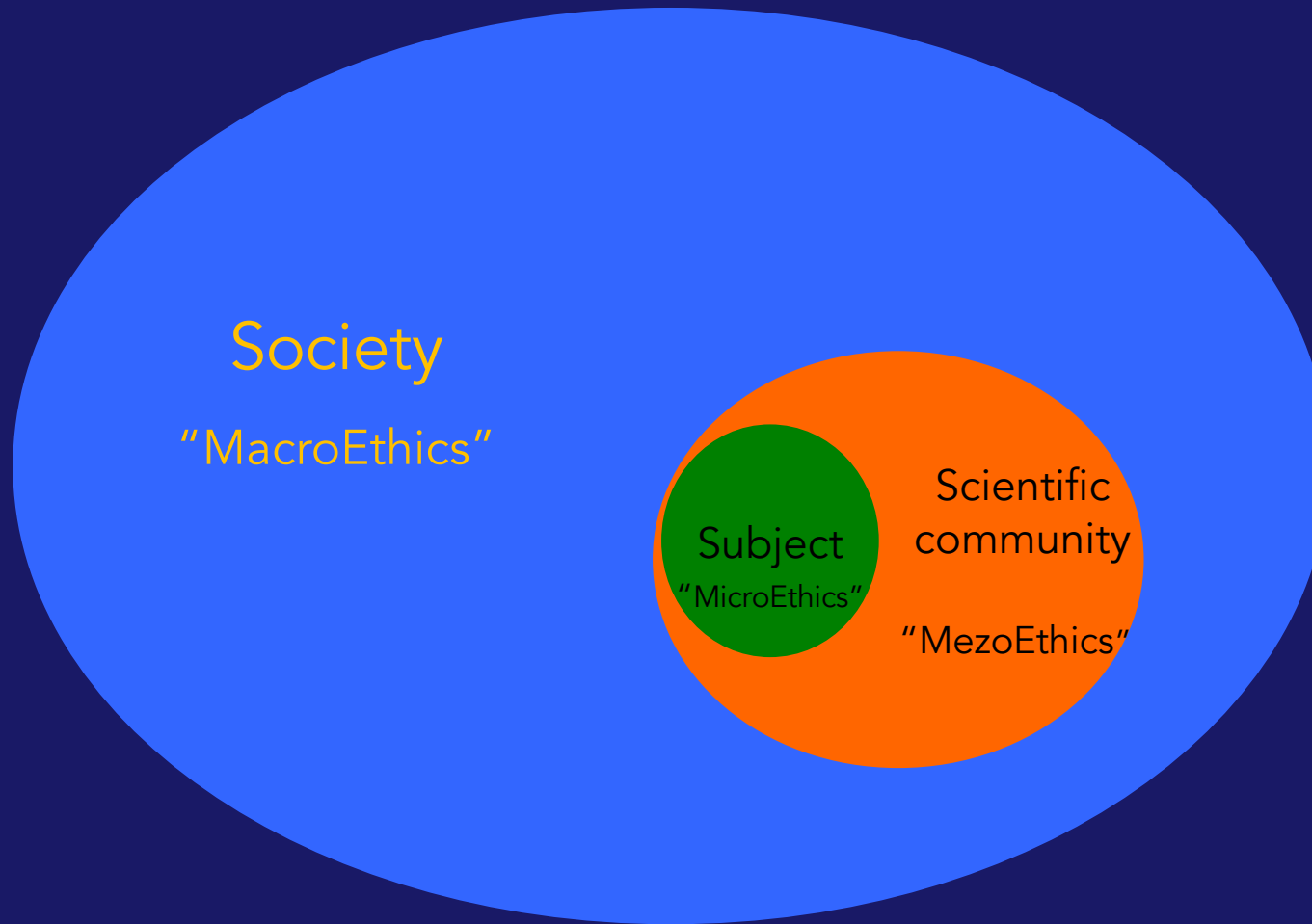
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The Elements of Digital Ethic



ETHICS from RESEARCH perspective

Domains of research ethics



Is it true?

- Scientific integrity

Is it fair?

To people

- Protection of human subjects
- Collegiality
- Institutional integrity

To nature

- Animal welfare
- Environmental protection

Is it wise?

- Social responsibility

Kenneth D. Pimple (2002) "Six Domains of Research Ethics. A Heuristic Framework for the Responsible Conduct of Research". *Science and Engineering Ethics* 8 , 191-205

Question for discussion

YOUR EXPERIENCES

EXAMPLES OF DIFFERENT LEVELS
OF ABSTRACTION IN THE DEBATE

VALUES

THE QUESTION OF VALUES

Often, new technology develops with little attention to its impact on human values



VALUES AND ETHICS IN KNOWLEDGE PRODUCTION



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

ETHICAL-EPISTEMIC* ANALYSIS

How values and priorities affect knowledge production

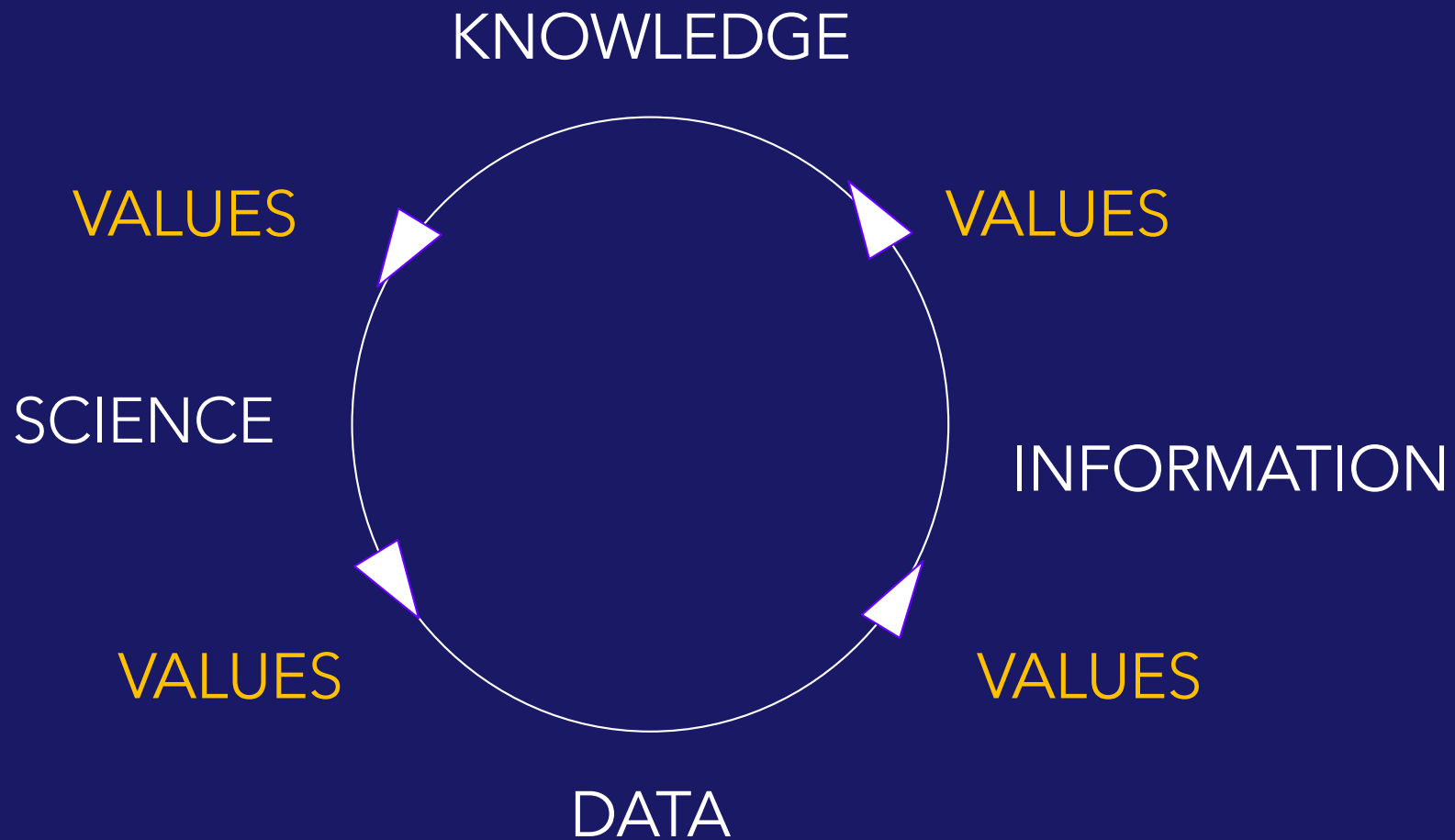
“Computer experts aren’t just building and manipulating hardware, software, and code, they are building systems that help to achieve important social functions, systems that constitute social arrangements, relationships, institutions. computer experts can facilitate and constrain behavior, and materialize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



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 values 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:

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

Research integrity basic values

Reliability in ensuring the quality of research is 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

VALUES IN RESEARCH

– THE CHOICES WE MAKE

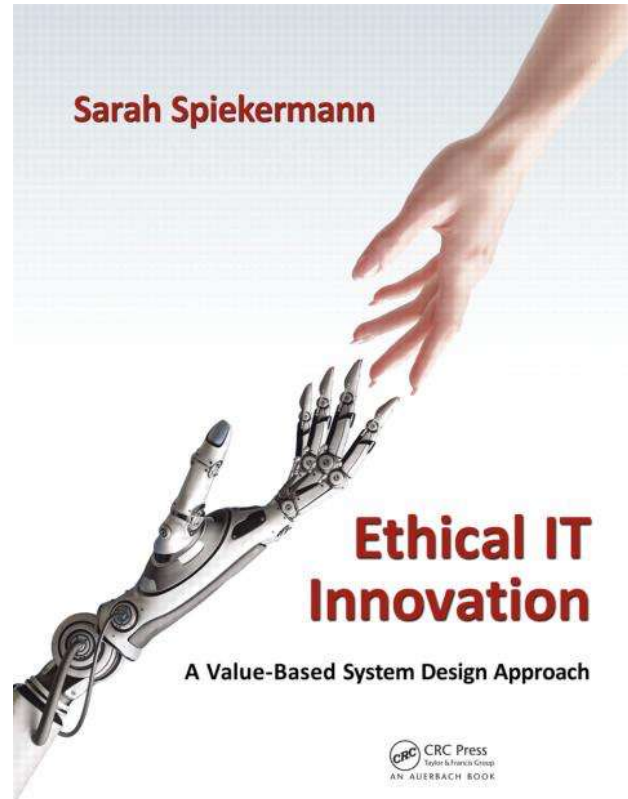
- The selection of research topics. What is a good basis for (We get involved with existing research. Or we get funding for a specific research. Or we choose freely. Why is this research worth our time and effort?)
- Choice of approach, methodology, tools. What are the values of a model, hypothesis, 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:

IEEE P7000

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

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

Question for the audience

YOUR EXPERIENCES
WITH THE ROLE OF VALUES IN YOUR
PROFESSIONAL LIFE

MY EXPERIENCES OF TEACHING ETHICS

Courses on Ethics and Topic Lectures

During more than twenty years, since 2001, I have been teaching students of Computer Science, Engineering, Interaction Design and occasionally Economics, in the following courses:

2001-2014 “[Professional ethics](#)” at Mälardalen University (Bachelor, MSc and PhD) and
2014-2017 “[Research Ethics and Sustainable Development](#)” at Chalmers University of Technology (PhD, Chalmers).

Even other courses that I have been teaching have important parts dedicated to ethics:

“[Emerging trends and Critical Topics in Interaction Design](#)” (Chalmers)

“[Human-centered design](#)” (BSc & MSc, Chalmers)

“[Research Methods in Natural Sciences and Engineering](#)” (PhD & MSc, MDH)

“[Advanced Computational Thinking and Writing Research Toolbox](#)” (2009-2012, MDH)

“[Computational Thinking and Writing Research Toolbox](#)” (2012-2013, MDH)

“[Information - Knowledge - Science – Ethics](#)” (in Swedish) (2013-2015, MDH)

I have regular guest lectures in Professional Ethics, Ethics of Computing, Ethics of AI, Design Ethics, Ethics for Cognitive Scientists, Robotic Ethics and Ethics of Autonomous Cars for different classes of computer science and engineering students.

PROFESSIONAL ETHICS COURSE

7.5 ECTS

Mälardalen University, Sweden

Gordana Dodig Crnkovic

Mälardalen University, Sweden

http://www.es.mdh.se/staff/37-Gordana_Dodig_Crnkovic




<https://www.mdh.se/staff?id=gdc01>







■ LECTURES

Professional Ethics in Science and Engineering, CD5590

Teacher and examiner: [Gordana Dodig-Crnkovic](mailto:gordana.dodig-crnkovic@mdh.se), gordana.dodig-crnkovic@mdh.se

Time & Place: Monday & Thursday, 13:15 - 15:00, Classroom V220 (V222 on 11-27 and 12-05)

DATE		TOPIC
3 Nov L1		GETTING STARTED. Course Preliminaries. Introduction. Administrivia. Identifying Moral Issues Basic Moral Orientations
6 Nov L2		METHODS AND TOOLS OF ANALYSIS OF ETHICAL ARGUMENT Philosophical Foundations of Ethics Ethical Relativism, Absolutism and Pluralism
10 Nov L3		The Ethics of Conscience The Ethical Egoism The Ethics of Duty The Ethics of Respect

<p>13 Nov L4</p>		<p>The Ethics of Consequences: Utilitarianism The Ethics of Rights The Ethics of Justice</p>
<p>17 Nov L5</p>		<p>The Ethics of Character The Ethics and Gender</p>
<p>20 Nov L6/E1</p>	 Beehives	<p>PROFESSIONAL AND ETHICAL RESPONSIBILITIES Codes of Ethics. Whistle Blowing <u>In-class activity: CASE STUDIES</u> (Jessica, Karin, Henrik)</p>
<p>24 Nov L7/E2</p>	 Beehives	<p>ENVIRONMENTAL ETHICS <u>In-class activity: CASE STUDIES</u> (Teresa, Said)</p>
<p>27 Nov L8</p>		<p>GUEST LECTURE BY PETER FUNK AI and Ethics</p>
<p>01 Dec L9</p>		<p>GUEST LECTURE BY KERSTI MALMSTEN Nursing and Medical Ethics</p>

<p>4 Dec L10/E3</p>	 <p>Beehives</p>	<p>PRIVACY AND CIVIL LIBERTIES <u>In-class activity: CASE STUDIES</u> (Virginia, Jörgen)</p>
<p>05 Dec L11</p>		<p>GUEST LECTURE BY MONIKA EIBORN Nuclear Non-proliferation and Ethics Nucleus 02 2003 side 39</p>
<p>08 Dec L12/E4</p>	 <p>Beehives</p>	<p>RISKS IN TECHNOLOGY AND SCIENCE PRECAUTIONARY PRINCIPLE <u>In-class activity: CASE STUDIES</u> (Jonas, Balaji, Artur)</p>
<p>11 Dec L13/E5</p>	 <p>Beehives</p>	<p>INTELLECTUAL PROPERTY <u>In-class activity: CASE STUDIES</u> (Magnus, Jens)</p>
<p>12 Dec L14/E6</p>	 <p>Beehives</p>	<p>COMPUTER GAMES AND ENTERTAINMENT <u>In-class activity: CASE STUDIES</u> (Thomas, Kim)</p>
<p>15 Dec L15</p>		<p>COURSE WRAP-UP</p>
<p>TAKE-HOME EXAM</p>		<p>RESEARCH PAPER + CLASS NOTES</p>



RESEARCH ETHICS & SUSTAINABLE DEVELOPMENT

CHALMERS UNIVERSITY OF TECHNOLOGY
SWEDEN

Learning Outcomes

- The aims of this course are to:
- 1) understand the **nature and range of ethical issues** in research and **sustainable** development;
- 2) understand what is meant by **sustainable development** and potential implications for research, in particular in the own research project;
- 3) familiarize with a **framework for decision making** when faced with ethical issues and
- 4) appreciate the **complex relation between science and society**.

Assessment of the Outcomes

A successful completion of this course will be judged on the following:

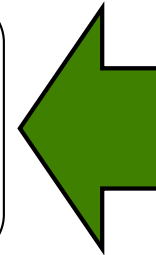
1. **Attendance** and **preparation** for the **in-class discussions**.
2. **Writing an essay** describing **ethical** and **sustainability** aspects of the PhD research project (or equivalent) of the participant. It is based on the interviews with at least two stakeholders.
3. **Participation in a peer review seminar** in which you give feedback on other graduate students essays and receive feedback on your own essay.
4. **Group work** preparing presentations for the Mini-conference.
5. **A Mini-conference** with **"lightning talk"** presentations of individual essays, common **group conclusions** and the subsequent **class discussion**.

Course Overview

Day 1

Problems & Principles

Course intro & Ethics (Gordana)
Sustainable Development (Magdalena)

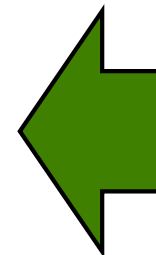


Assignmen
t and
readings

Day 2

Science and Society

Research Policy (Sven)
Publishing Ethics & Societal Aspects
of Technology (Guest lectures)

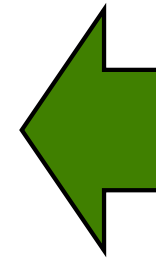


Assignmen
t and
readings

Course Overview

Day 3

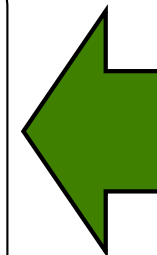
Peer Review Meeting
for SD-RE Essays
(Class in Review Groups)



Essay
SD-RE

Day 4

Group Meetings
(Class, preparation for Mini-conf.)



Preparation for
the Mini-
conference

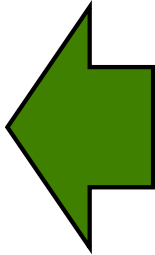
Course Overview

Day 5

Mini-conference

(Class, Gordana)

1 2 3 4 | 5 6 7 8



“Lightning talk”
individual
presentations;
group conclusions
followed by the
class discussion

EXAMINATION FORMS IN MY ETHICS COURSES

- INDIVIDUAL CLASS-NOTES – What did I find interesting in this lecture – students' own reflections
- IN-CLASS PRESENTATION OF A CHOSEN TOPIC – Students choose a topic from their research. For undergrads, topics that interest them.
- RESEARCH PAPER, WITH THE AIM TO PRESENT AT A CONFERENCE OR PUBLISH IN A JOURNAL
- PRESENTATION ON THE MINI-CONFERENCE (IN CLASS)

Ethics publications in collaboration with my students

- Holstein, T., Dodig-Crnkovic, G., & Pelliccione, P. (2021). [Steps Towards Real-world Ethics for Self-driving Cars: Beyond the Trolley Problem](#). In Steven John Thompson (Ed.), Machine Law, Ethics, and Morality in the Age of Artificial Intelligence. IGI Global
- Dodig-Crnkovic, G., Holstein, T., & Pelliccione, P. (2021). [Future Intelligent Autonomous Robots, Ethical by Design. Learning from Autonomous Cars Ethics](#). <https://arxiv.org/abs/2107.08122>
- Holstein, T., Dodig-Crnkovic, G., & Pelliccione, P. (2020). Real-world Ethics for Self-Driving Cars. In Proceedings of the 42nd International Conference on Software Engineering (ICSE '20) Poster Track. <https://ethics.se>
- Holstein, T., Dodig-Crnkovic G. (2018) [Avoiding the Intrinsic Unfairness of the Trolley Problem](#). [Avoiding the Intrinsic Unfairness of the Trolley Problem](#), FairWare '18: Proceedings of the IEEE/ACM International Workshop on Software Fairness, Gothenburg, May 2018, pp. 32-37. doi: 10.23919/FAIRWARE.2018.8452918 <https://dblp.org/db/conf/icse/fairware2018.html> <https://dl.acm.org/doi/10.1145/3194770.3194772>
- Holstein, T., Dodig-Crnkovic G. and Pelliccione P. (2018) [Ethical and Social Aspects of Self-Driving Cars](#), <http://arxiv.org/abs/1802.04103>
- Johnsen, A., Dodig-Crnkovic G., Lundqvist K., Hänninen K., Pettersson P. [Risk-based Decision-making Fallacies: Why Present Functional Safety Standards Are Not Enough](#). MARCH2017 International Workshop on decision Making in Software Architecture @ ICSA 2017 Gothenburg, Sweden. 04.04.2017. Published in: Software Architecture Workshops (ICSAW), 2017 IEEE International Conference. DOI: 10.1109/ICSAW.2017.50

Ethics publications in collaboration with my students

- Dodig-Crnkovic G. and Çürüklü B. [Robots - Ethical by Design](#), Ethics and Information Technology 2011, Volume 14, Number 1, pp. 61-71.
<http://www.springerlink.com/content/f432g33181787u63/fulltext.html>
- **Irfan Šljivo, Elena Lisova, Sara Afshar** (2017) [Agent-Centred Approach for Assuring Ethics in Dependable Service Systems](#). 2017 IEEE World Congress on Services (SERVICES), Legal, Social and Ethical Aspects of Services Science. pp. 51-58
- Dodig-Crnkovic, G. and **Sapienza, G.**, [Ethical Aspects of Technology in the Multi-Criteria Decision Analysis](#). IACAP conference, Ferrara, June 14-17, 2016.
- **Sapienza, G.**, Dodig-Crnkovic, G. and Crnkovic, I. [Inclusion of Ethical Aspects in Multi-Criteria Decision Analysis](#). Proc. WICSA and CompArch conference. Decision Making in Software ARCHitecture (MARCH), 2016 1st International Workshop. Venice April 5-8 2016. DOI: 10.1109/MARCH.2016.5, ISBN: 978-1-5090-2573-2. [IEEE](#)
- **Jägemar, M.** and Dodig-Crnkovic, G. [Cognitively Sustainable ICT with Ubiquitous Mobile Services - Challenges and Opportunities](#). In Proceedings of the 37th International Conference on Software Engineering - [ICSE '15](#), Vol. 2. IEEE Press, NJ, USA, 531-540.
- **Thekkilakattil, A.** and Dodig-Crnkovic, G., [Ethics Aspects of Embedded and Cyber-Physical Systems](#) In [IEEE Proceedings of COMPSAC 2015: The 39th Annual International Computers, Software & Applications Conference, Symposium on Embedded & Cyber-Physical Environments \(ECPE\)](#). Taichung, Taiwan - July 1-5, pp. 39-44, 2015. DOI: 10.1109/COMPSAC.2015.41
- **Backhaus P.** and Dodig-Crnkovic G., [Wikileaks and Ethics of Whistle Blowing](#), Proceedings IACAP 2011. The computational Turn: Past, Presents, Futures?, p 332, Mv-Wissenschaft, Münster, Århus University, Danmark, Editor(s): Charles Ess and Ruth Hagengruber, July 2011

Ethics publications in collaboration with my students

- Çürüklü B., Dodig-Crnkovic G., Akan B., [Towards Industrial Robots with Human Like Moral Responsibilities](#), 5th ACM/IEEE International Conference on Human-Robot Interaction, Osaka, Japan, March, 2010
- Georgieva M. and Dodig-Crnkovic G., [Who Will Have Irresponsible, Untrustworthy, Immoral Intelligent Robot?](#), Proceedings IACAP 2011. The Computational Turn: Past, Presents, Futures?, p 129, Mv-Wissenschaft, Münster, Århus University, Danmark, Eds.:Charles Ess and Ruth Hagengruber, July 2011
- Ahiska, C. (2010) [Computer-Mediated Human Manipulation and Uniqueness of Computer Ethics - http://www.idt.mdh.se/kurser/comphil/2009/CAP-FINAL/CerenAhiska-final.pdf](#) - Presented at ECAP 2010
- Gawrylczyk, R. (2010) [Should Robots That Interact With Humans Look Like Humans? - http://www.idt.mdh.se/kurser/comphil/2009/CAP-FINAL/GawrylczykRobert_final.pdf](#) Presented at ECAP 2010
- Dodig-Crnkovic G. and Anokhina M., [Workplace Gossip and Rumor: The Information Ethics Perspective](#), Proceedings of the Tenth International Conference ETHICOMP 2008, Living, Working And Learning Beyond Technology, T W Bynum, M C Calzarossa, I De Lotto and S Rogerson, (Editors)
- Dodig-Crnkovic G., Horniak V., [Ethics and Privacy of Communications in the e-Polis](#), Information Security and Ethics: Concepts, Methodologies, Tools, and Applications Edited By: Hamid Nemati, 2008
- Dodig-Crnkovic G., Horniak V., [Ethics and Privacy of Communications in the e-Polis](#), Encyclopedia of Digital Government, Idea Group Reference, July 25, 2006

Ethics publications in collaboration with my students

- Dodig-Crnkovic G., Horniak V., [Togetherness and Respect - Ethical Concerns of Privacy in Global Web Societies](#). Special Issue of AI & Society: The Journal of Human-Centred Systems and Machine Intelligence, on "Collaborative Distance Activities: From Social Cognition to Electronic Togetherness", CT. Schmidt Ed., Vol 20 No.3, 2006
- Dodig-Crnkovic G., and Larsson, T. [Game Ethics - Homo Ludens as a Computer Game Designer and Consumer](#). International Journal of Information Ethics, Special Issue on The Ethics of E-Games, Vol. 4 - December 2005
- Dodig-Crnkovic G. and Horniak V., [Good to Have Someone Watching Us from a Distance? Privacy vs. Security at the Workplace](#). Ethics of New Information Technology, Proceedings of the Sixth International Conference of Computer Ethics: Philosophical Enquiry, CEPE 2005, July 17- 19, 2005, University of Twente, Enschede, The Netherlands; Brey P, Grodzinsky F and Introna L, Eds. <http://cepe2005.utwente.nl/>
- Larsson, M. [Predicting Quality Attributes in Component-based Software Systems](#), PhD Thesis, Mälardalen University Press, Sweden, ISBN: 91-88834-33-6, 2004 (Chapter on ethics aspects)
- Larsson, S. [Improving Software Product Integration](#), Licentiate Thesis, Mälardalen University Press, Sweden, ISBN 91-88834-65-4, 2005 (Chapter on ethics aspects)

Doctoral symposium @IS4SI conference 2017

Papers written by my students based on their course essays

- **Faragardi**, H.R. (2017) [Ethical Considerations in Cloud Computing Systems](#). Proceedings. 1. 166. 10.3390/IS4SI-2017-04016.
- **Holstein**, T. (2017) [The Misconception of Ethical Dilemmas in Self-Driving Cars](#). Proceedings. 1. 166. 10.3390/IS4SI-2017-04016.
- **Wallmyr**, M. (2017) [Exploring interaction design with information intense heavy vehicles](#). Proceedings. 1. 166. 10.3390/IS4SI-2017-04016.
- **Maro**, S, (2017) [The automotive domain - From Multi-disciplinarity to Transdisciplinarity](#). Proceedings. 1. 166. 10.3390/IS4SI-2017-04016.
- **Nyende**, H. (2017) [Predicting pregnancy complications in low resource contexts - A case study of maternal healthcare in Uganda](#). Proceedings. 1. 166. 10.3390/IS4SI-2017-04016.
- **Smith**, G. (2017) [Ethical aspects of pursuing participatory research as an industrial doctoral student](#). Proceedings. 1. 166. 10.3390/IS4SI-2017-04016.
- **Kade**, D. (2015) [Ethics of Virtual Reality Applications in Computer Game Production](#). Philosophies 1 (1), 73-86

APA Computing and Philosophy journal

Papers written by my students based on their course essays

- [Linda Sebek \(2013\) *Assistive Environment: The Why and What.*](#)
APA Computing and Philosophy journal



Articles from the course Computing and Philosophy

Computing and Philosophy course started in 2004nas Swedish National Course, developed as a result of collaboration in a research network PI (Torbjörn Lager, Joakim Nivre, Jan Odelstad, Björn Lisper, Peter Funk, Jan Gustafsson, Ulla Ahonen-Jonnarth, Gordana Dodig-Crnkovic). Participants from different universities (Blekinge, Dalarna, Mälardalen, Skövde, Uppsala) have taken part in the course. They have presented their research papers at the Mini-conference.

Several articles written for the course have been accepted for international conferences and published otherwise.

Afterward, for several years, the CAP course was held in collaboration with the University of Illinois Springfield (Peter Boltuc) with guest lecturers Luciano Floridi, Erik Sandewall, Lars-Göran Johansson, Vincent Müller, and others).

Thomas Larsson: [Ethics of the Hyperreal](#)

Magnus Johansson: [When Simulations Become Reality](#)

Kim Anttila: [Ethics in the Computer Profession](#)

Mikael Sandberg: [Gender Distribution Normalization in the Computer Game Development Arena](#)

Omar Bagdadi: [Is Big Brother a Human Necessity?](#)

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ECAP2010 conference

Before starting a Phd course on Ethics

Student identify ethical question
important for their research fields.

An Example of an introductory survey for Ph.D. students in SE with a focus on automation - August 2018

809

Automation

47. Automation and Ethics

Srinivasan Ramaswamy, Hemant Joshi

Should we trust automation? Can automation cause harm to individuals and to society? Can individuals apply automation to harm other individuals? The answers are yes; hence, ethical issues are deeply associated with automation. The purpose of this chapter is to provide some ethical background and guidance to automation professionals and students. Governmental action and economic factors are increasingly resulting in more global interactions and competition for jobs requiring lower-end skills as well as those that are higher-end endeavors such as research. Moreover, as the Internet continually eliminates geographic boundaries, the concept of doing business within a single country is giving way to companies and organizations focusing on serving and competing in international frameworks and a global marketplace. Coupled with the superfluous nature of an Internet-driven social culture, the globally-distributed digitalization of work, services and products, and the reorganization of work processes across many organizations have resulted in ethically challenging questions that are not just economically, or socially sensitive, but also highly culturally sensitive. Like the shifting of commodity manufacturing jobs in the late 1900s, standardization of information technology and engineering jobs have also accelerated the prospect of services and jobs more easily moved across the globe, thereby driving a need for innovation in design, and in the creation of higher-skill jobs. In this chapter, we review the fundamental concepts of ethics as it relates to automation, and then focus on the impacts of automation and their significance in both education and research.

47.1 Background	810
47.2 What is Ethics, and How Is It Related to Automation?	810
47.3 Dimensions of Ethics	811
47.3.1 Automation Security	813
47.3.2 Ethics Case Studies	814
47.4 Ethical Analysis and Evaluation Steps	814
47.4.1 Ethics Principles	816
47.4.2 Codes of Ethics	817
47.5 Ethics and STEM Education	817
47.5.1 Preparing the Future Workforce and Service-Force	818
47.5.2 Integrating Social Responsibility and Sensitivity into Education	818
47.5.3 Dilemma-Based Learning	819
47.5.4 Model-Based Approach to Teaching Ethics and Automation (Learning) ..	820
47.6 Ethics and Research	822
47.6.1 Internet-Based Research	822
47.6.2 More on Research Ethics and User Privacy Issues	823
47.7 Challenges and Emerging Trends	825
47.7.1 Trends and Challenges	825
47.8 Additional Online Resources	826
47.A Appendix: Code of Ethics Example	827
47.A.1 General Moral Imperatives	827
47.A.2 More Specific Professional Responsibilities	829
47.A.3 Organizational Leadership Imperatives	830
47.A.4 Compliance with the Code	831
References	831

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Topics with ethical relevance that students identified in the questionnaire before the lecture – **technology aspects**

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?

Topics with ethical relevance identified

- methodology aspects

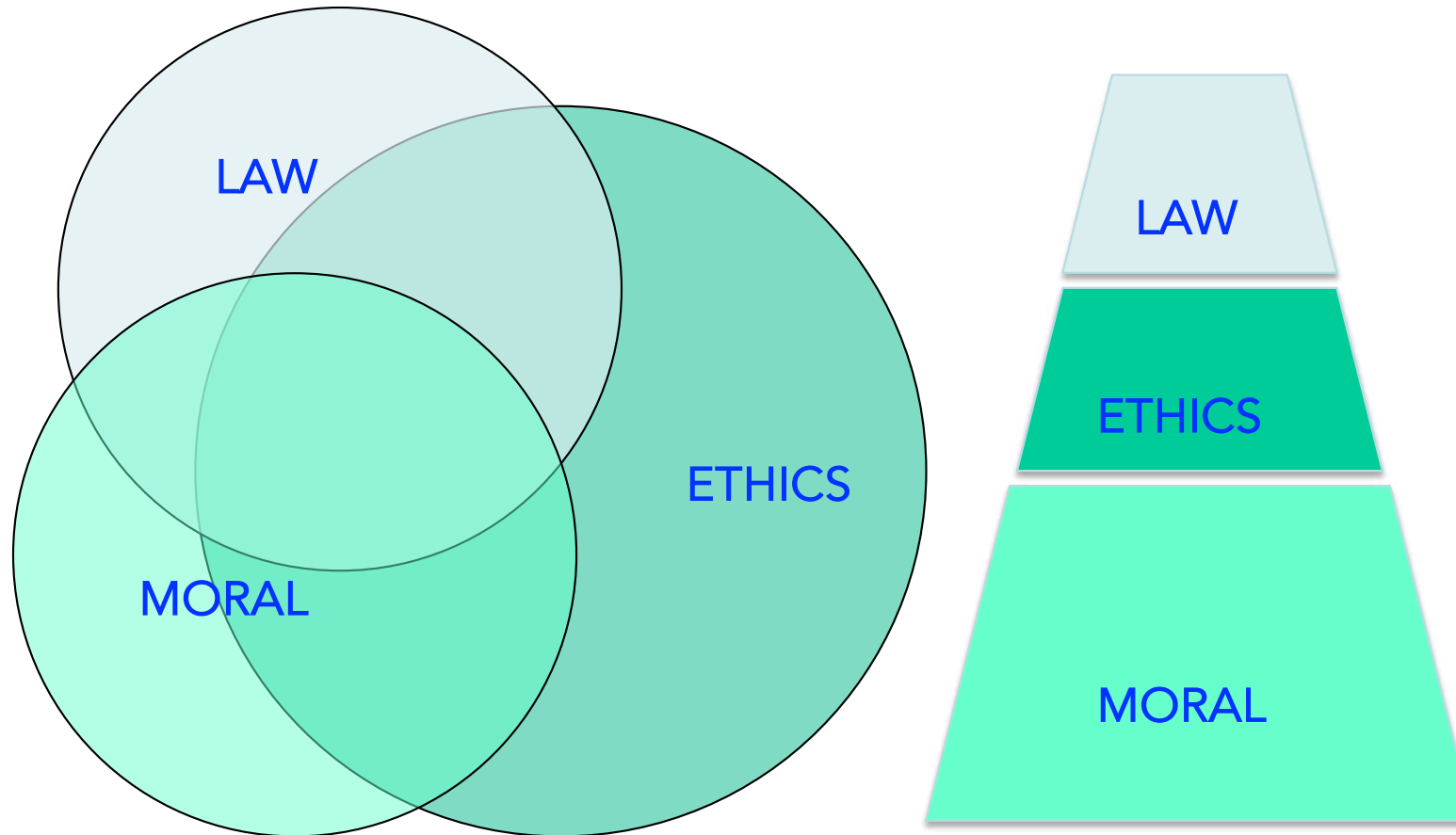
- Values
- The method
- Epistemic problems related work - acknowledging its limitations
- Reducing reality into a model, with loss of depth and variety of perspectives?
- Marginalizing the designer in the design process?
- Level of transparency is acceptable for an automated tool?
- Should we rely on 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 connection between qualitative and quantitative information
- Application of the complex system in Landscape studies
- Reproducibility
- System's performance 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 of their importance)
- Value of an intervention compared to other applications

The topic is huge – Introduction to ethics

What this lecture can do is to open the window with a view



Societal normative systems



Question for the audience

Academic integrity course
confidentiality of the content that students
discuss in the classroom, like ethically
questionable behavior of supervisors.

Q: Should the teacher in the course report
e.g. power abuse by a supervisor?

STAKEHOLDERS INVOLVEMENT
ETHICS AS A CONTINUUM,
AN ONGOING CONVERSATION

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

POLICY VACUUMS

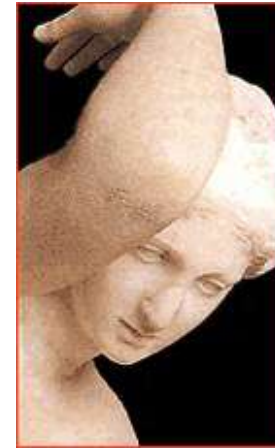
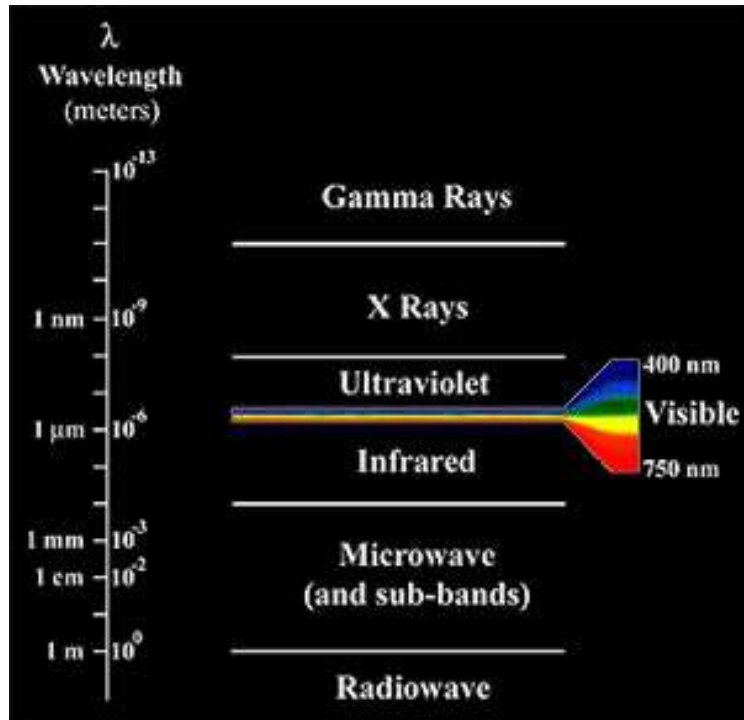
Ethics of present-day technology and developing society – example of computer ethics

“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>

STAKEHOLDERS AND DIFFERENT PERSPECTIVES

World seen in different light



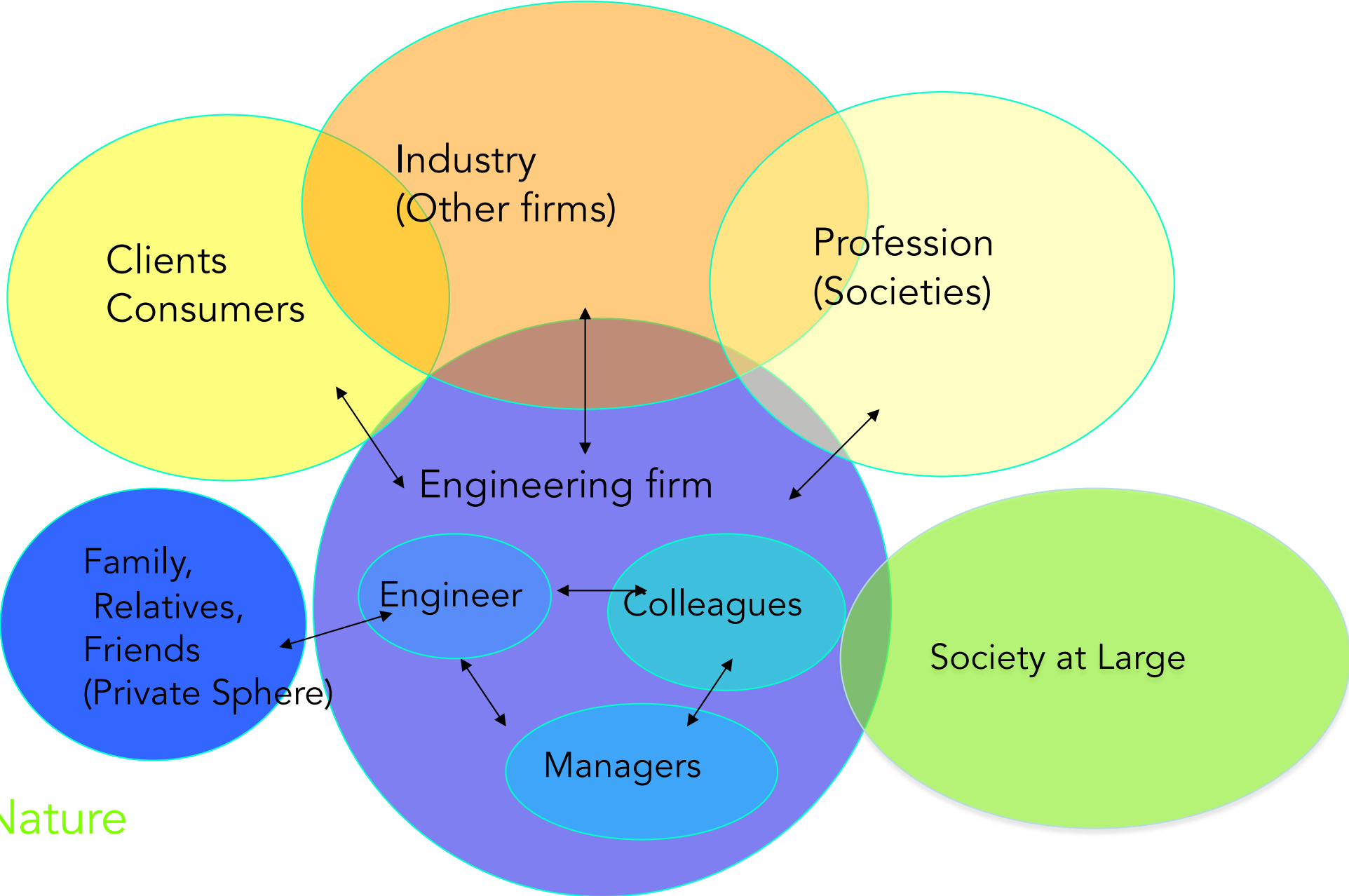
What if we could see in any wavelength of the electromagnetic spectrum, from gamma-rays to radio waves? How would the world appear to us?

STAKEHOLDERS IN AN ACADEMIC RESEARCH PROJECT



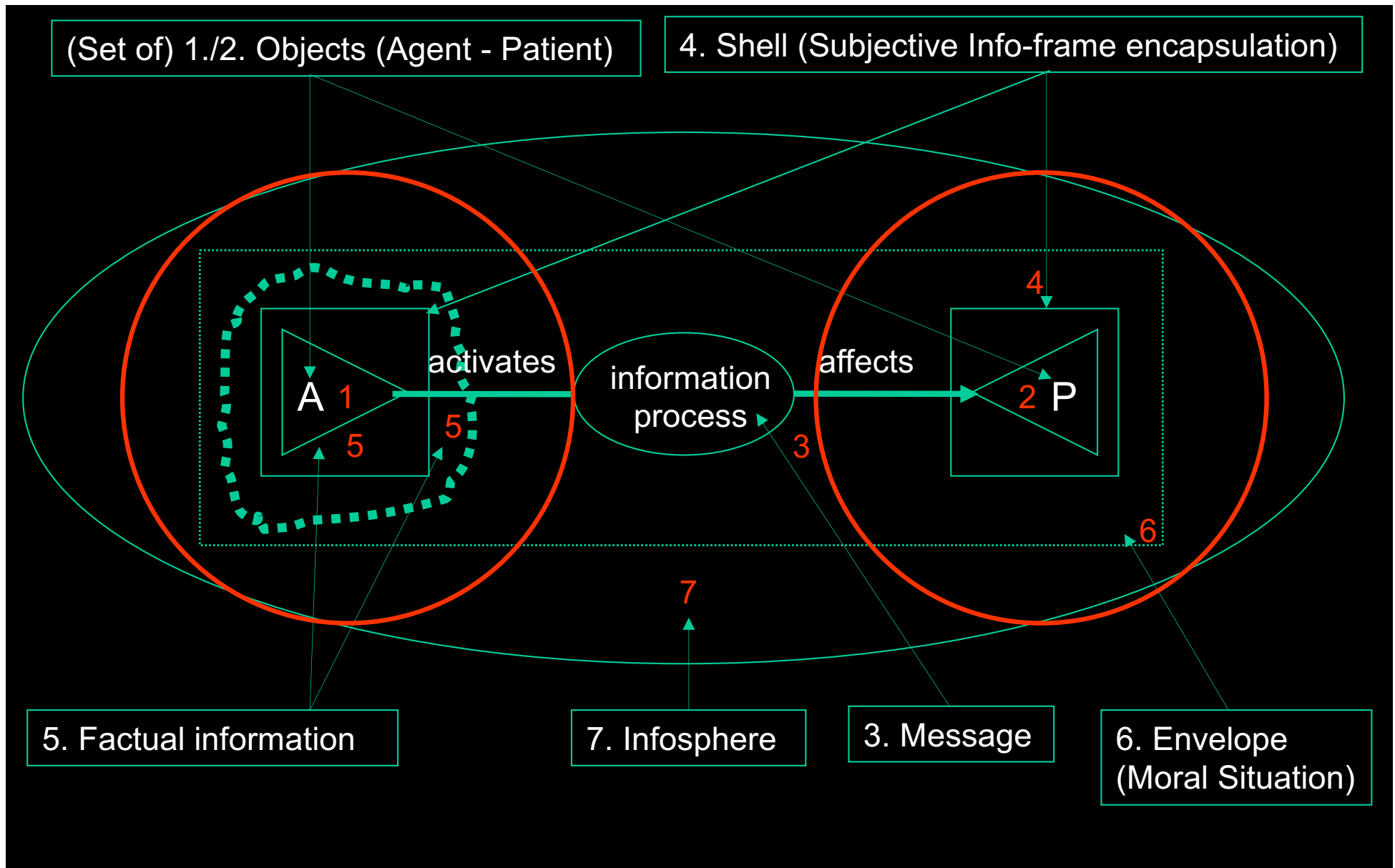
Nature

STAKEHOLDERS IN AN INDUSTRIAL RESEARCH PROJECT



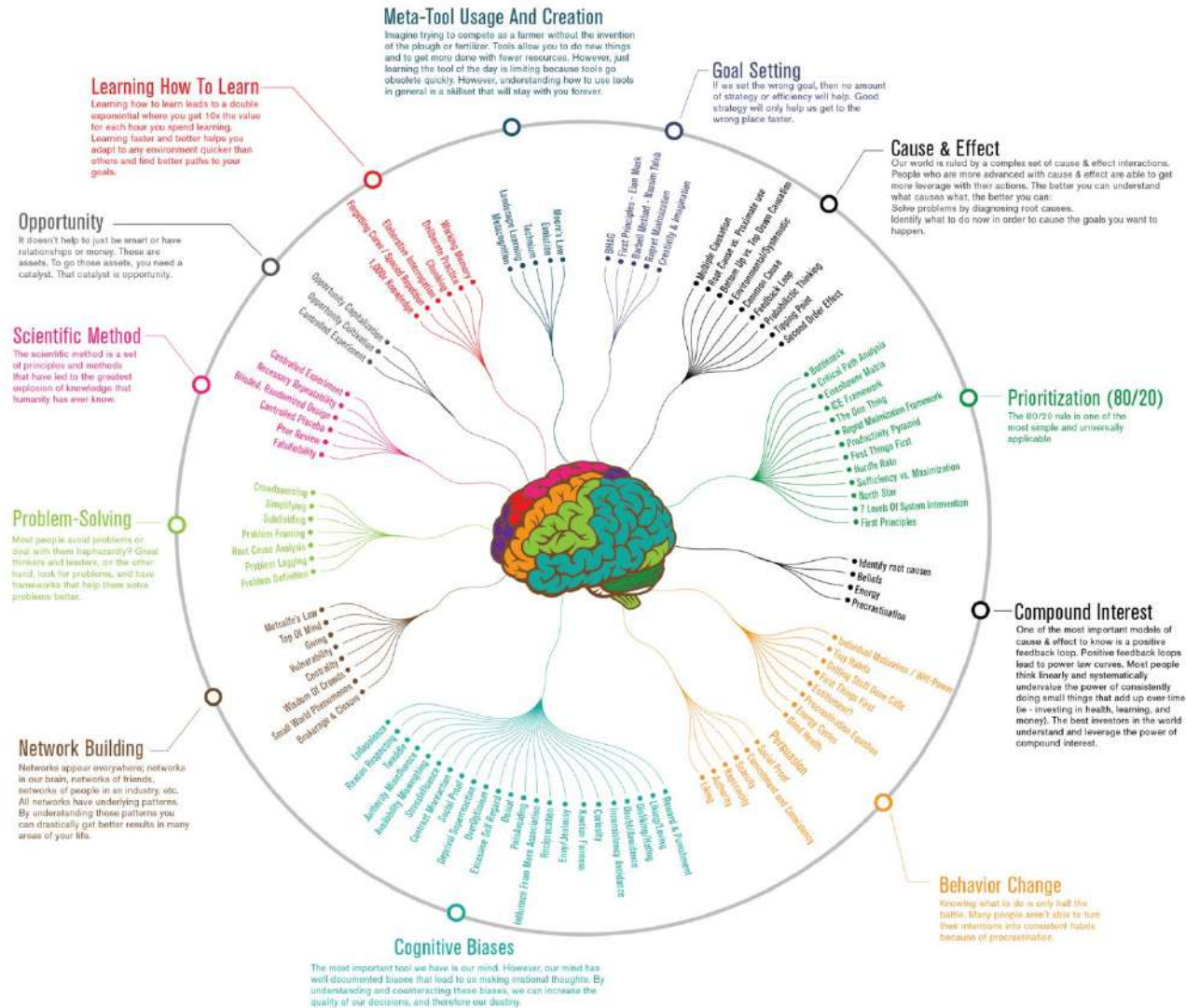
Nature

The informational model of moral action - Floridi



HUMAN COGNITIVE BIASES

The Top 12 Most Useful & Universal Mental Models



ETHICS IN RESEARCH

ETHICS IN RESEARCH

The state of the art in today's research and society



“Mode 1” and “Mode 2” research

Mode 1, classical academic

Mode 2, collaboration with industry and society, usually undertaken as a succession of projects, each justified in advance to a funding body whose members are usually not scientists.

Important feature of “mode-2” science is that it is largely the work of teams of scientists, often networked over several different institutions. Where, then, do the ethical responsibilities lie?

OPEN QUESTION: HOW DO WE INVOLVE ALL IMPORTANT STAKEHOLDERS AND HOW TO NEGOTIATE COMMON SOLUTIONS? (THINKING IN TERMS OF COMPLEX SOCIO-TECHNOLOGICAL NETWORKS)

Ethical sensitivity

Why must scientists become more ethically sensitive than they used to be? John Ziman 1998

“Academic science” vs. “Industrial science”

Academic science basically individualistic, following Merton norms (1942) Science as free “speech community.”

“The only constraint—an immensely powerful one in practice—was that the results of their research would be closely scrutinized by other members of one of the innumerable specialized research communities that partition the scientific world.” [PEER REVIEW]

ETHICAL DECISION MAKING

- Recognizing the moral issue
- Evaluating alternative actions from various moral points of view
- Making a decision
- Acting
- Considering the action in retrospect

EXAMPLE OF DOCUMENTS ADDRESSING ETHICAL CONSIDERATIONS

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)



EXAMPLE OF DOCUMENTS ADDRESSING ETHICAL CONSIDERATIONS



**The European
Code of Conduct for
Research Integrity**
REVISED EDITION



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

REFLECTIONS, SUMMARY

REFLECTIONS FROM EXPERIENCE IN “WORKING FOR ETHICS IN COMPUTING/INFORMATICS/CS”

- Relevance of ethics topics for students' own context
- Applicability and generalizability of approaches from what is learned
- Humble teaching attitude – no preaching and no besserwisser (know-all) style
- Using authority/power with utmost care
- Ethics is not about being perfect but being as good as reasonably possible, given human cognitive (including emotional) constraints
- Introducing students to the world of research ethics and real-world problems
- Cultivating analytic-synthetic thinking, and logical reasoning/argument
- Respect for different positions/traditions/cultures, stakeholders
- Necessity of understanding the subject matter (technology) to make informed judgments
- Interdisciplinarity/Transdisciplinarity center-stage
- Keeping in mind – we are educating for the FUTURE – identifying seeds of future developments and addressing their promises and challenges
- Educating T-SHAPED ENGINEERS – deep in technology, broad in humanities (Barry Bohm)

BEYOND COMPLIANCE

DISTRIBUTED COGNITION IN NETWORKS OF AGENTS
LEARNS IN DIFFERENT NODES OF THE SYSTEM,
EXCHANGING EXPERIENCES

STRENGTH OF DIVERSITY

CONTINUOUSLY LEARNING SYSTEM

REFERENCES

References in full text can be found on my web page:

<http://gordana.se/>