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https://www.usi.ch/en/feeds/27126

Navigating the White-Water World with Digital Humanism

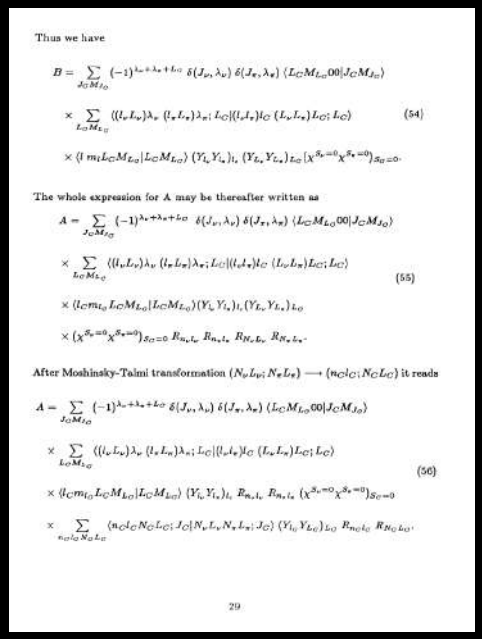
Emergent Intelligent Technologies between Utopia and Dystopia

Gordana Dodig Crnkovic

Senior Professor of Computer Science at Mälardalen University and

Professor of Interaction Design, Chalmers University of Technology, Sweden, http://gordana.se/

My background - from formal to natural languages



Thus we have

$$B = \sum_{J_C M_{J_C}} (-1)^{\lambda_\nu+\lambda_\pi+L_C} \delta(J_\nu,\lambda_\nu)\,\delta(J_\pi,\lambda_\pi)\,\langle L_C M_{L_C} 00 | J_C M_{J_C}\rangle$$

$$\times \sum_{L_C M_{L_C}} \langle (l_\nu L_\nu)\lambda_\nu\,(l_\pi L_\pi)\lambda_\pi; L_C | (l_\nu l_\pi) l_C\,(L_\nu L_\pi) L_C; L_C\rangle \qquad (54)$$

$$\times \langle l\ m_l L_C M_{L_C} | L_C M_{L_C}\rangle\,(Y_{l_\nu} Y_{l_\pi})_{l_i}\,(Y_{L_\nu} Y_{L_\pi})_{L_C}\,\{\chi^{S_\nu=0}\chi^{S_\pi=0}\}_{S_C=0}.$$

The whole expression for A may be thereafter written as

$$A = \sum_{J_C M_{J_C}} (-1)^{\lambda_\nu+\lambda_\pi+L_C}\ \delta(J_\nu,\lambda_\nu)\,\delta(J_\pi,\lambda_\pi)\,\langle L_C M_{L_C} 00 | J_C M_{J_C}\rangle$$

$$\times \sum_{L_C M_{L_C}} \langle (l_\nu L_\nu)\lambda_\nu\,(l_\pi L_\pi)\lambda_\pi; L_C | (l_\nu l_\pi) l_C\,(L_\nu L_\pi) L_C; L_C\rangle \qquad (55)$$

$$\times \langle l_C m_{l_C} L_C M_{L_C} | L_C M_{L_C}\rangle (Y_{l_\nu} Y_{l_\pi})_{l_i} (Y_{L_\nu} Y_{L_\pi})_{L_C}$$

$$\times \{\chi^{S_\nu=0}\chi^{S_\pi=0}\}_{S_C=0}\,R_{n_\nu l_\nu}\,R_{n_\pi l_\pi}\,R_{N_\nu L_\nu}\,R_{N_\pi L_\pi}.$$

After Moshinsky-Talmi transformation $(N_\nu L_\nu; N_\pi L_\pi) \longrightarrow \{n_C l_C; N_C L_C\}$ it reads

$$A = \sum_{J_C M_{J_C}} (-1)^{\lambda_\nu+\lambda_\pi+L_C}\,\delta(J_\nu,\lambda_\nu)\,\delta(J_\pi,\lambda_\pi)\,\langle L_C M_{L_C} 00 | J_C M_{J_C}\rangle$$

$$\times \sum_{L_C M_{L_C}} \langle (l_\nu L_\nu)\lambda_\nu\,(l_\pi L_\pi)\lambda_\pi; L_C | (l_\nu l_\pi) l_C\,(L_\nu L_\pi) L_C; L_C\rangle \qquad (56)$$

$$\times \langle l_C m_{l_C} L_C M_{L_C} | L_C M_{L_C}\rangle\,(Y_{l_\nu} Y_{l_\pi})_{l_i}\,R_{n_\nu l_\nu}\,R_{n_\pi l_\pi}\,\{\chi^{S_\nu=0}\chi^{S_\pi=0}\}_{S_C=0}$$

$$\times \sum_{n_C l_C N_C L_C} \langle n_C l_C N_C L_C; J_C | N_\nu L_\nu N_\pi L_\pi; J_C\rangle\,(Y_{l_C} Y_{L_C})_{L_C}\,R_{n_C l_C}\,R_{N_C L_C}.$$

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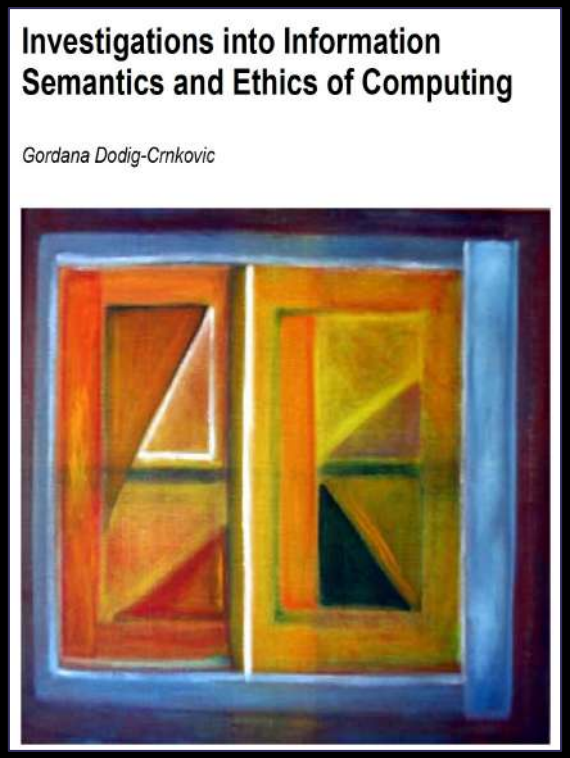
PhD in Physics, 1988
On Alpha-decay, Department of Physics, University of Zagreb



PhD in Computing, 2006
Computer Science, Mälardalen University

Current: Morphological Computing and Cognition
AI Ethics, Digital Ethics, Digital Humanism

Transformative emerging intelligent technologies

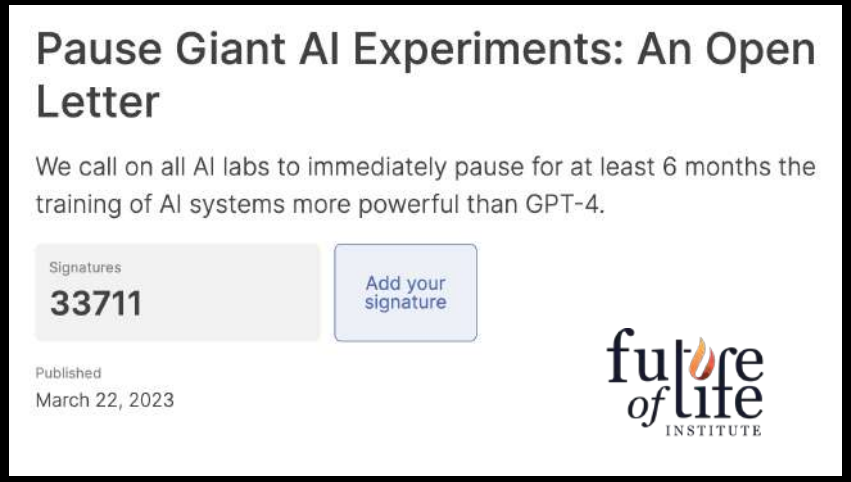
- We live in an era of transformative AI technologies that profoundly alter our civilization, reshape existing software and hardware, and challenge our understanding of fundamental concepts such as intelligence, consciousness, language, education, research, ethics, sustainability, and more.

- The pace of technological advancement is accelerating.

- Today's technology isn't an isolated domain managed solely by specialists and industries. Instead, it's an integral component of a broader techno-social system.

- As stakeholders—both professionals and citizens—we must maintain a long-term perspective and actively participate in decision-making about future technologies. We can't assume that a few years from now technology will remain as it is today."

Examples of collective action towards regulation of artificial intelligence (AI)



Signatories include: Yoshua Bengio, Stuart Russell, Gary Marcus, Emad Mostaque, Elon Musk, Tristan Harris, Steve Wozniak and Yuval Noah Harari.

Geoffrey Hinton and Yoshua Bengio warned in May 2023:

"Mitigating the risk of extinction from AI should be a global priority alongside other societal-scale risks such as pandemics and nuclear war," The letter published by nonprofit organization Center for AI Safety.

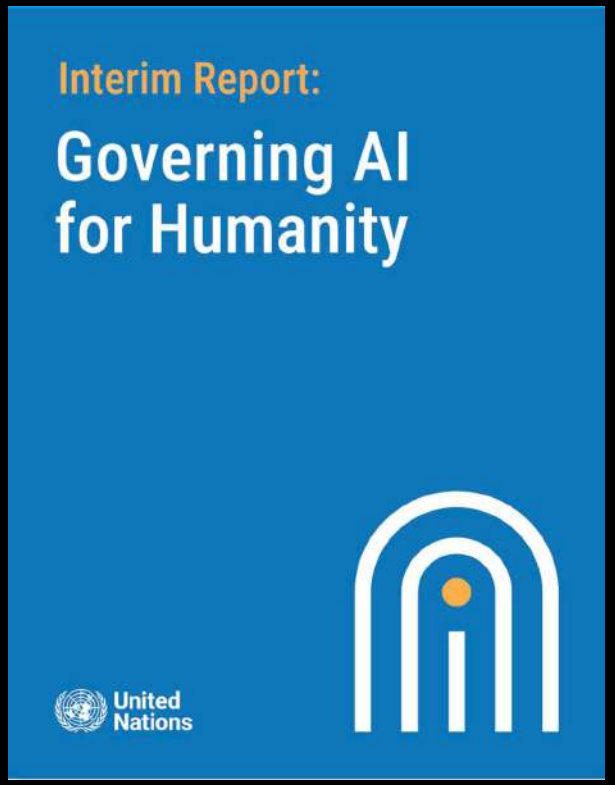
Other signatories include researchers from the Vector Institute and Mila, as well as professors from universities across Canada. Open AI CEO Sam Altman, Microsoft CTO Kevin Scott, etc.

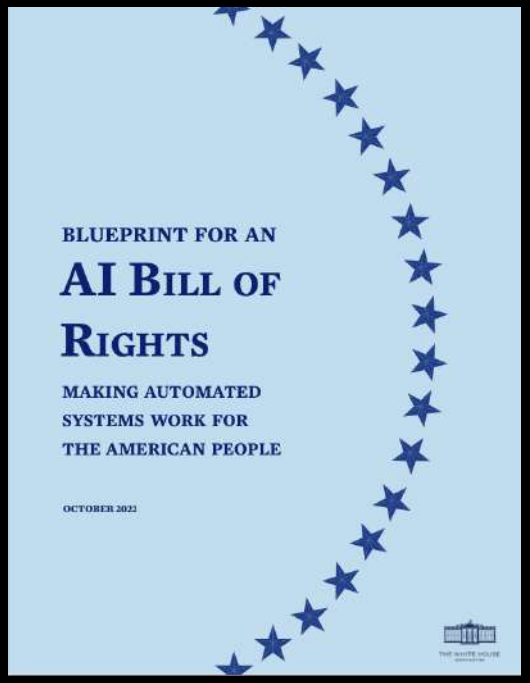
Academics, CEOs sign on in support of AI regulation and Bill C-27 as Canadian companies race to adopt the technology

Since Last year, work on AI regulation

United Nations report (2023)
“Governing AI for Humanity”

https://w.un.org.techenvoy/files/ai_advisory_body_interim_report.pdf





https://www.whitehouse.gov/wp-content/uploads/2022/10/Blueprint-for-an-AI-Bill-of-Rights.pdf

The US AI Bill of Rights outlines principles, including that people have a **right to control how their data is used** and to **not be discriminated against by unfair algorithms.**

It is a white paper, which does not have the force of law. It's primarily aimed at the federal government and could influence **which technologies government agencies acquire**, or help parents, workers, policymakers, and designers **ask tough questions about artificial intelligence systems**.

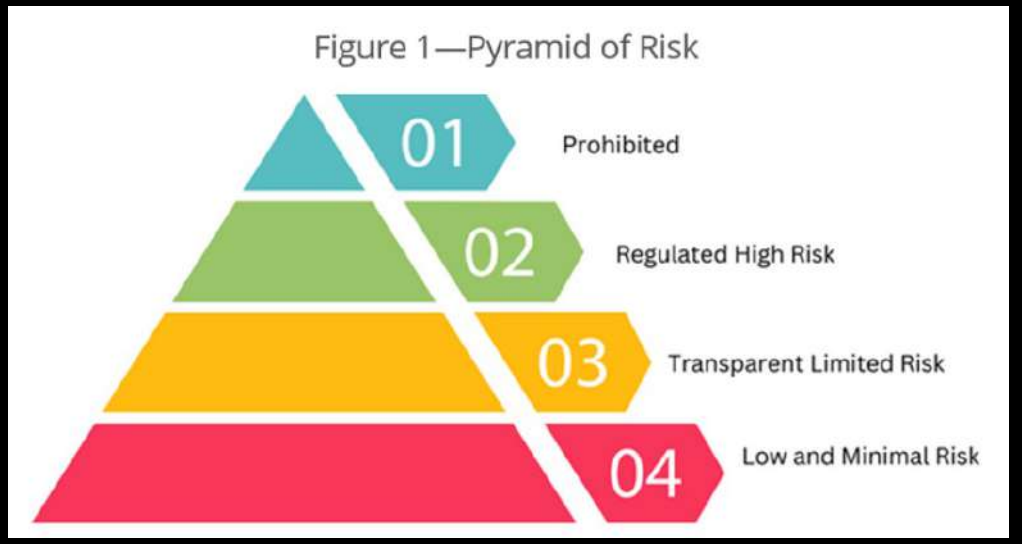
However, it can't constrain large tech companies, which arguably play a bigger role in shaping future applications of AI.

EU's "AI Act" (2024)

The world's first AI legislation

AI Act, European Commission. Shaping Europe's digital future

https://digital-strategy.ec.europa.eu/en/policies/regulatory-framework-ai



ISACA

The European Parliament granted final approval of the EU Artificial Intelligence Act on March 13, 2024, by a vote of 523 for passage, 46 against, and 49 abstaining. The Act faces a final step – approval by EU member states – as its provisions gradually take effect.

ASSIGNMENT OF RESPONSIBILITY: WHO DECIDES?

Time perspective

- Short-term perspective
  We, humans, decide
- Middle-term perspective
  AGI & We co-decide
- Long-term perspective
  Superintelligence? Who decides?

Stakeholders

- Politicians
- Legislators
- Businesses
- Requirements engineers
- Designers, Developers
- Programmers
- Deployment engineers, testers
- Maintenance engineers

Learning from experience. Feedback on development & design

Questions

- In the turbulent currents of today's world, filled with disruptive intelligent technologies, how can we navigate to evade dystopic scenarios?
- How can we envision the broader landscape of a future human-centered digital society?
- What does a desirable future look like for both humans and our planet, steering towards common preferred futures/utopias?

Plan of the talk

- Navigating Possible Futures: Speculative Design
- Complexity & Systemic Thinking
- A White Water World & Emergence in Ecologies of Change
- Value-based Human-centric Design
- Digital Humanism
- A Case Study: Ethics Of Autonomous Cars
- Wrap-up

We are discussing possible futures with socially disruptive technologies

OF COURSE, PRESENT-DAY TECHNOLOGY CAN NOT BE NEGLECTED, LIKE FEMINIST APPROACHES AND CRITICAL DESIGN, BUT WE DO NOT FOCUS ON THAT.

Design for possible & preferable futures – Speculative design

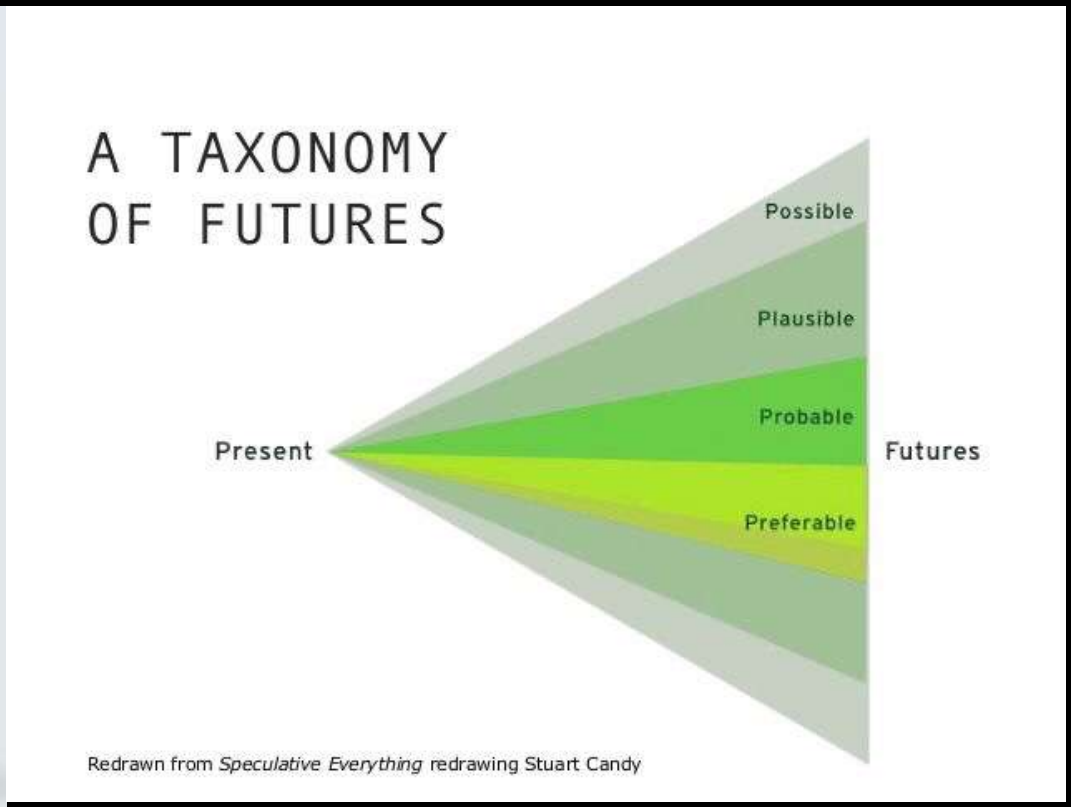
Speculative design combines informed, hypothetical extrapolations of an emerging technology's development with a deep consideration of the cultural landscape into which it might be deployed, to speculate on future products, systems and services.

These speculations are then used to examine and encourage dialogue on the impact a specific technology may have on our everyday lives.

Auger Loizeau

https://elviavasconcelosblog.wordpress.com/2017/01/15/what-is-speculative-critical-fiction-design-part-1/

Speculative Everything – Antony Dunne and Fiona Raby

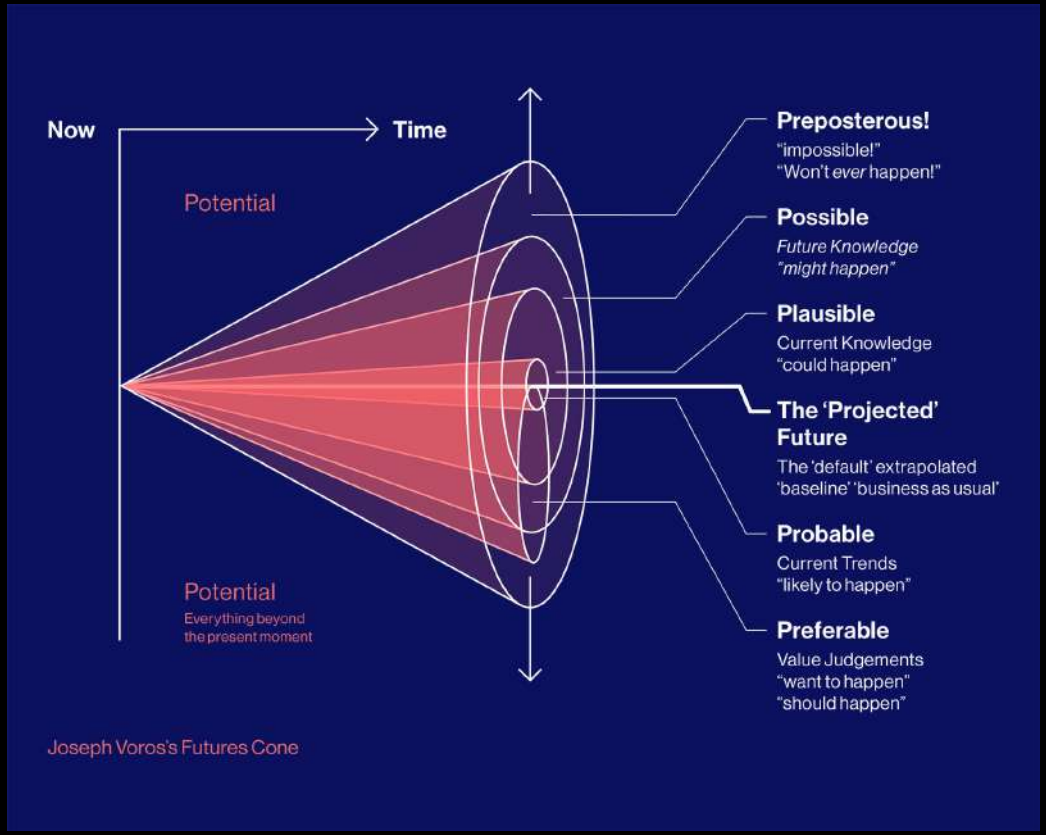


"what if" questions

https://www.youtube.com/watch?v=kmibm20UsoA

Table of Contents:
Beyond radical design?
A map of unreality
Design as critique
Consuming monsters: big, perfect, infectious
A methodological playground: fictional worlds and thought experiments
Physical fictions: invitations to make believe
Aesthetics of unreality
Between reality and the impossible
Speculative everything.

Speculative Design creates space to…



Arrange emerging (not yet available) technological 'elements' to hypothesize future, products and artifacts.

Apply alternative plans, motivations, or ideas to those currently driving technological development, in order to facilitate new arrangements of existing elements.

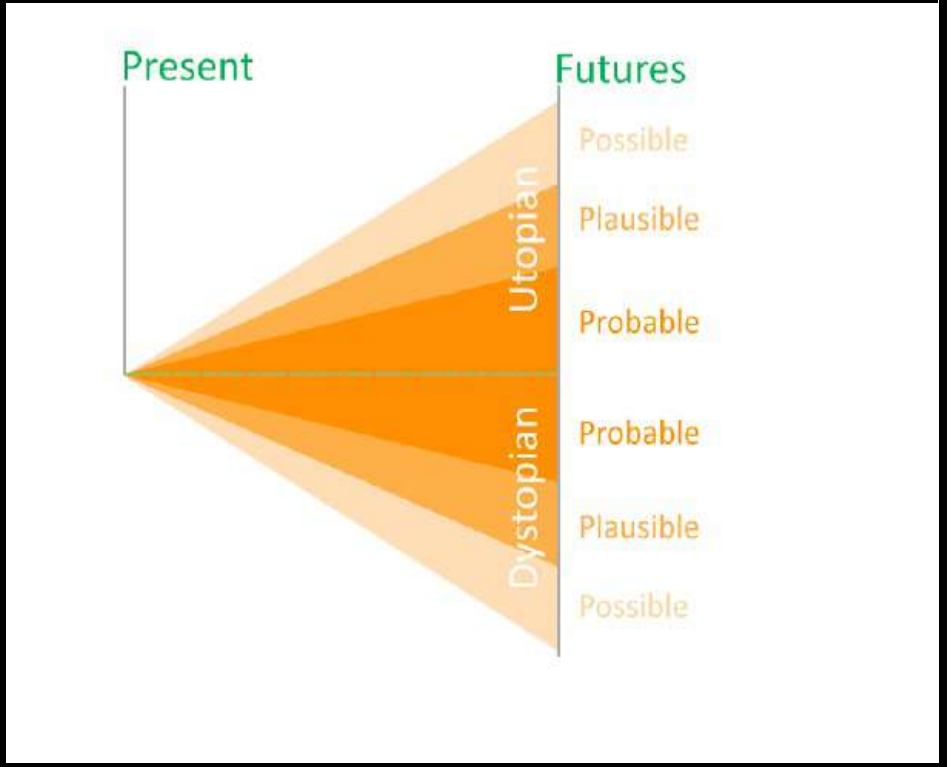
Develop new perspectives on big systems.

Speculative Design Facilitates…

Exploration of 'What is a better future (with respect to the present)?'

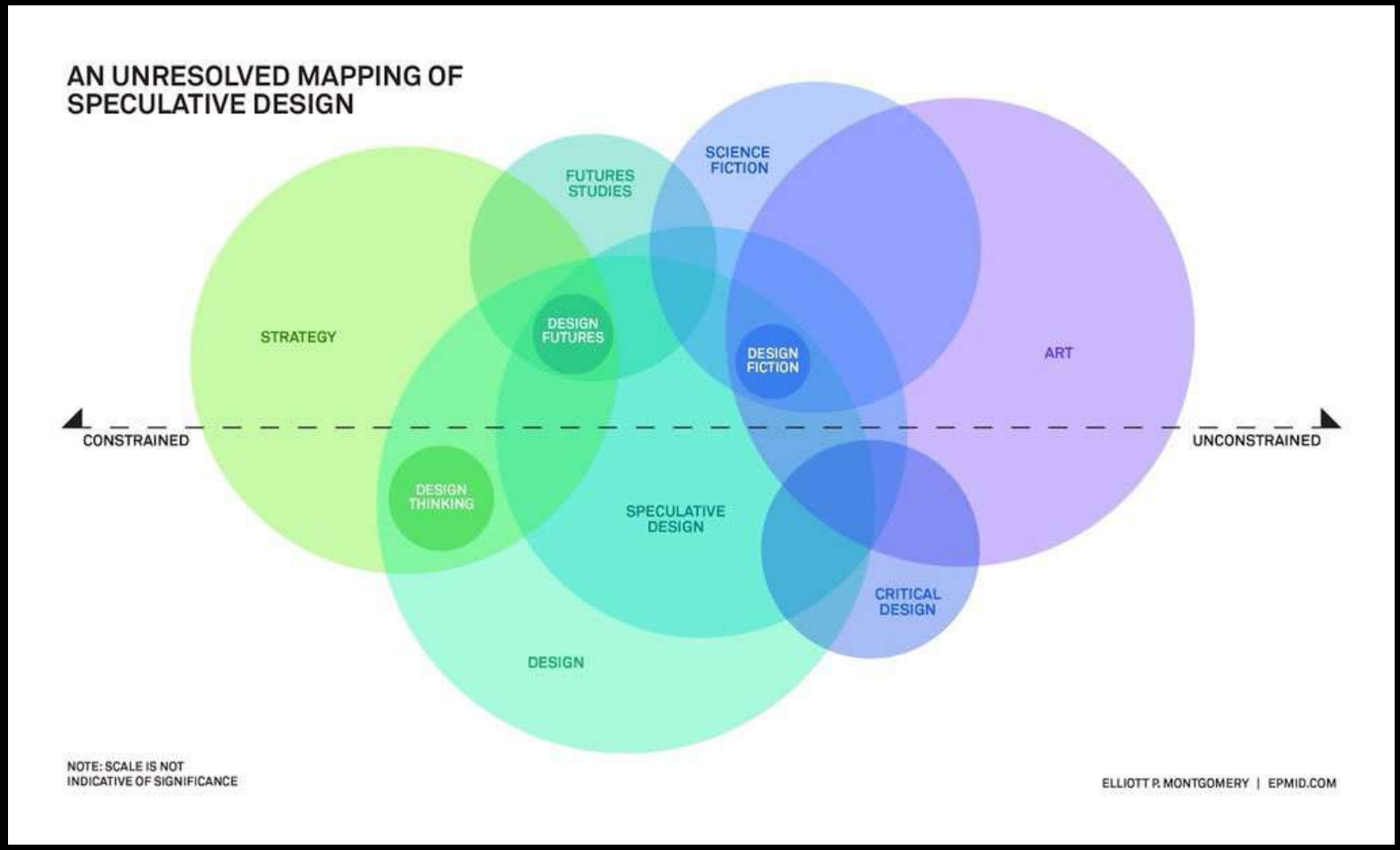
Generating a better understanding of the potential implications of a specific (disruptive) technology in various contexts and on multiple scales – with a particular focus on everyday life.

Moving design 'upstream' – to not simply package technology at the end of the technological journey but to impact and influence that journey from its genesis.



Giovanni M Troiano, Matthew Wood, Mustafa Feyyaz Sonbudak, Riddhi Chandan Padte, and Casper Harteveld. 2021. "Are We Now Post-COVID?": Exploring Post-COVID Futures Through a Gamified Story Completion Method. In Proceedings of the 2021 ACM Designing Interactive Systems Conference (DIS '21). ACM, New York, NY, USA, 48–63. https://doi.org/10.1145/3461778.3462069

Speculative Design and its context



https://speculativeedu.eu/new-reflections-on-speculativity/

Complexity & systemic thinking in hyper-connected society

https://humanparts.medium.com/making-sense-of-complexity-ee78755d56b9

ADD TO THIS PICTURE (INTELLIGENT) INTERNET OF THINGS!

Design Unbound. Designing for emergence in a 'white water world'.

(1) Designing for Emergence & (2) Ecologies of Change

Design Unbound. Designing for Emergence in a White Water World.

Ann Pendleton-Jullian and
John Seely Brown, MIT Press 2018

https://www.desunbound.com/
https://www.youtube.com/watch?v=-U8h4wNBfCQ
https://www.youtube.com/watch?v=tFPvK1mO6Sg
https://www.youtube.com/watch?v=Lto8szGvPfM
https://www.desunbound.com/assets/DesUnbound_chapter_8.pdf

Richard Buchanan (1992) Wicked Problems in Design Thinking. Design Issues, Vol. 8, No. 2, pp. 5-21. The MIT Press http://www.jstor.org/stable/1511637.

A 'White Water World' – complex & dynamic

"We are forcing the past as a solution set. But the past as a solution set is not a viable option. We need a new toolset."

Complexity science gives us a new lens through which to view the world as one that is entangled and emerging.

Design Unbound presents a new tool set for having agency in the world today, which we characterize as a 'white water world' – one that is rapidly changing, hyperconnected and radically contingent.

Imagination as a 'muscle that must be exercised' (John Seely Brown)

Hyperconnectivity transition from equilibrium to constant non-equilibrium. The need for adaptivity, anticipation and resilience.

'Wicked problems': As soon as you start to solve them, they morph. "Computational irreducibility" - you must run the model to see the outcome. Computation takes the same time as the process itself.

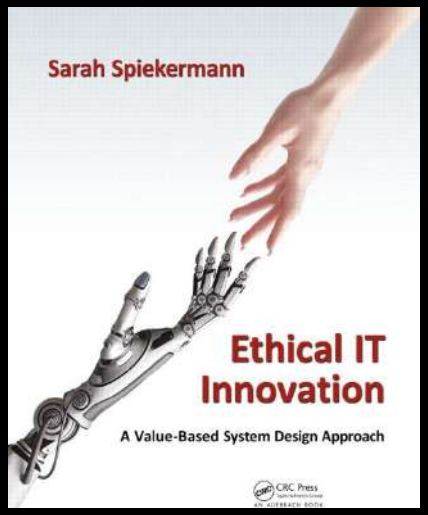
VALUE-BASED HUMAN-CENTRIC DESIGN

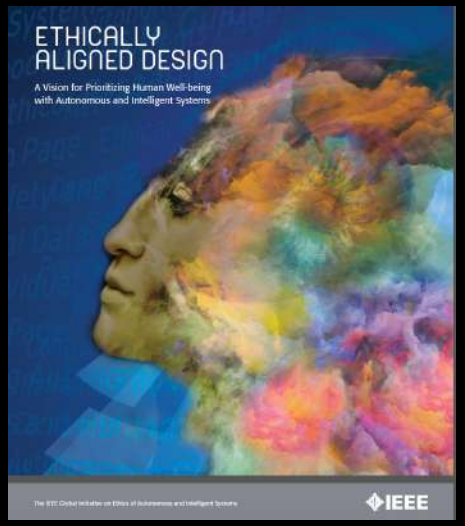
Values

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.

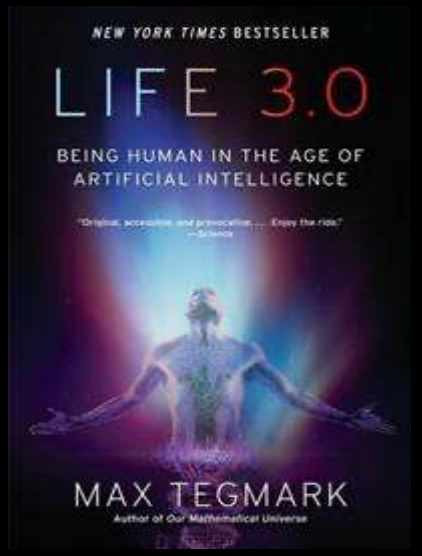
A VALUE-BASED DESIGN APPROACH

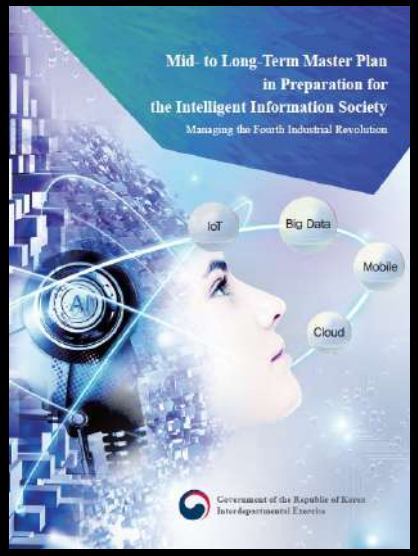


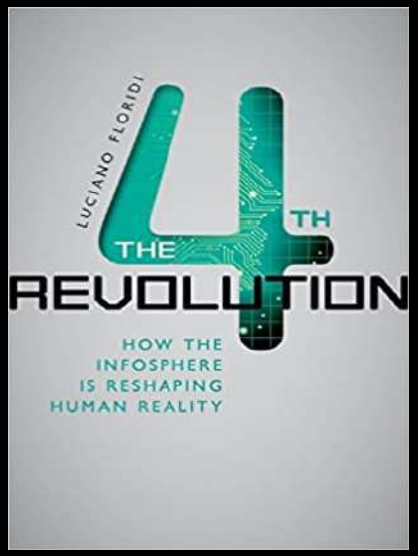


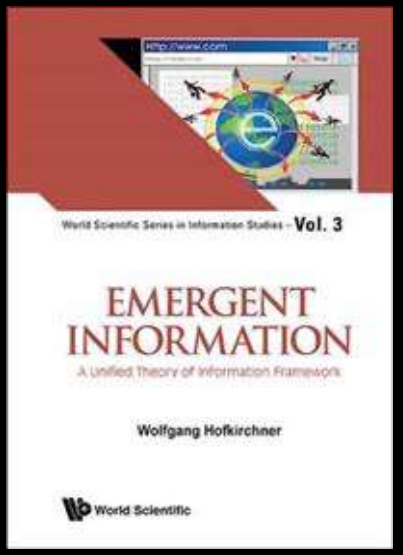
One question we can ask is: How much time can we afford to spend on the "ideation phase" before starting to actually build technology?
Andrew Ng points out for a startup it is more profitable to identify which technology can be built, and then go and build it, instead of spending a lot of time thinking about all possible alternatives: https://www.youtube.com/watch?v=5p248yoa3oE (29:08)

Human-centered future intelligent society









"In the Fourth Industrial Revolution, the convergence of artificial intelligence, robot technology, big data and software disrupts fields such as labor, welfare, employment, education and defense. This has sparked revolutionary change across society."

Wikipedia, https://en.wikipedia.org/wiki/Intelligent_information_society

The Digital Humanism Initiative

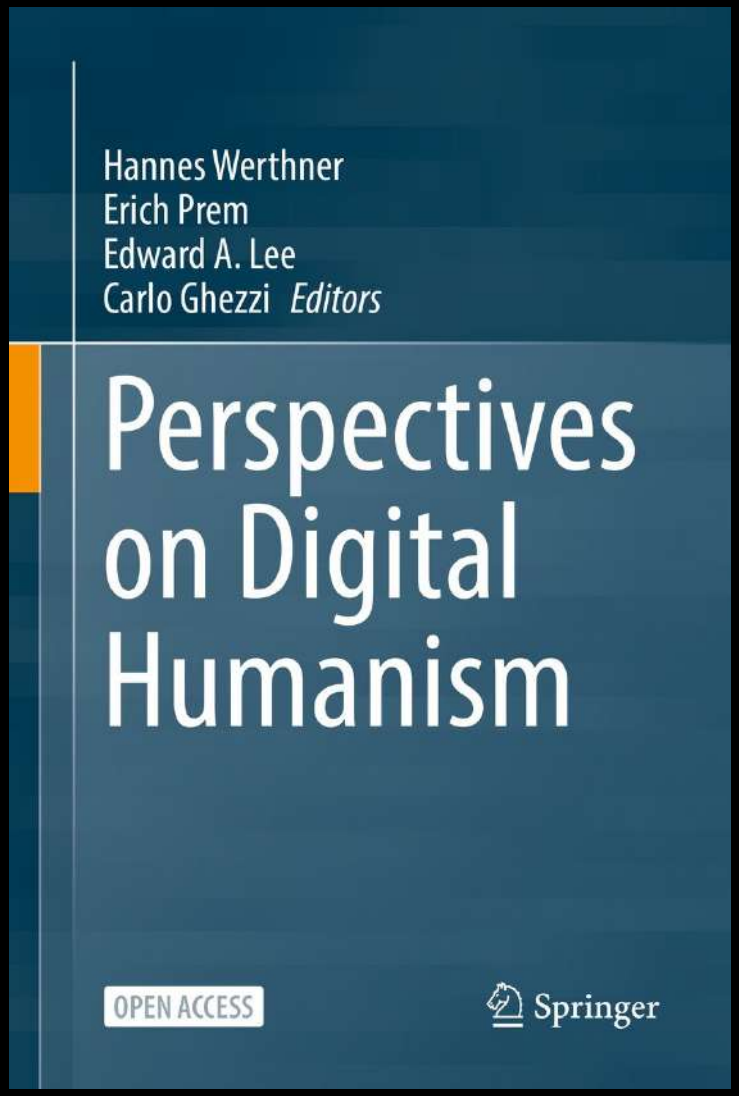
The Digital Humanism Initiative is an international collaboration seeking to build a community of scholars, policy makers, and industrial players who are focused on ensuring that technology development remains centered on human interests.

- Digital humanism is a global, international issue.
- The approach: scientific, transdisciplinary, interdisciplinary, multidisciplinary, in the tradition of the Enlightenment.
- People are the central focus, as individuals and societies.
- Technology is for people and not the other way around.
- Humankind is at the center.
- Building a just and democratic society with humans at the center of technological progress.

https://dighum.ec.tuwien.ac.at/ Digital Humanism movement web page @ TUW – Technical University in Vienna

E. Prem, L. Hardman, H. Werthner, P. Timmers (eds.). Research, innovation, and education roadmap for digital humanism. The Digital Humanism Initiative. Vienna, 2022. https://dighum.ec.tuwien.ac.at/

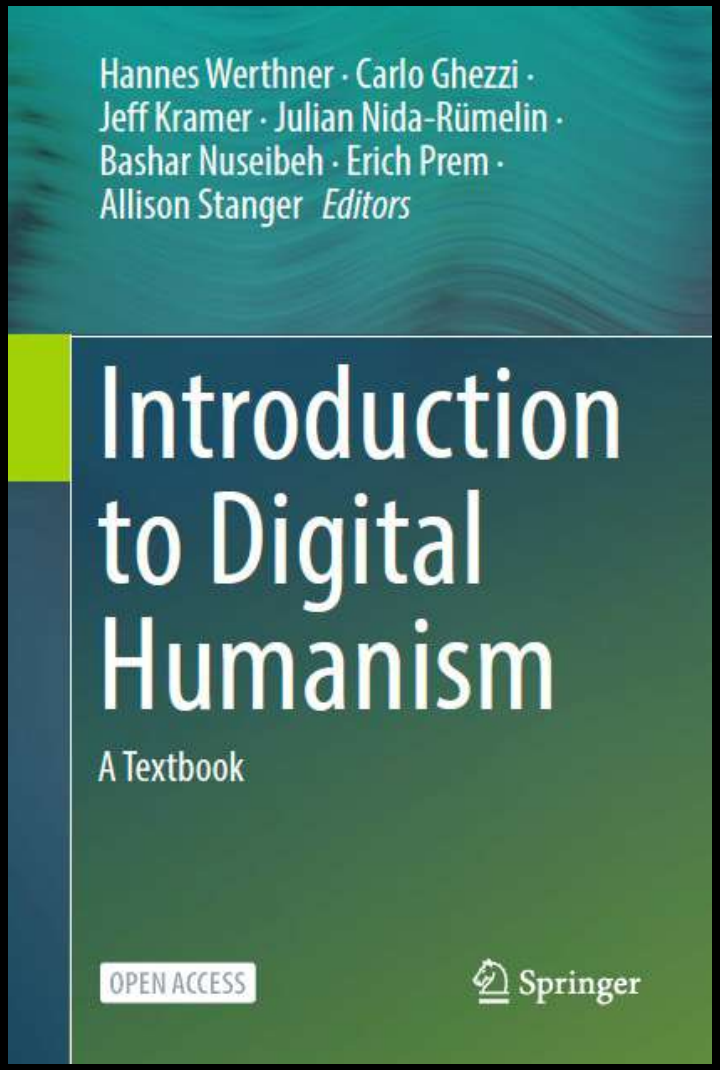
Perspectives on Digital Humanism – Open Access



Hannes Werthner, Erich Prem, Edward A. Lee, and Carlo Ghezzi (eds): **Perspectives on Digital Humanism**, Springer, 2022. https://link.springer.com/book/10.1007/978-3-030-86144-5

Introduction to Digital Humanism – A Textbook

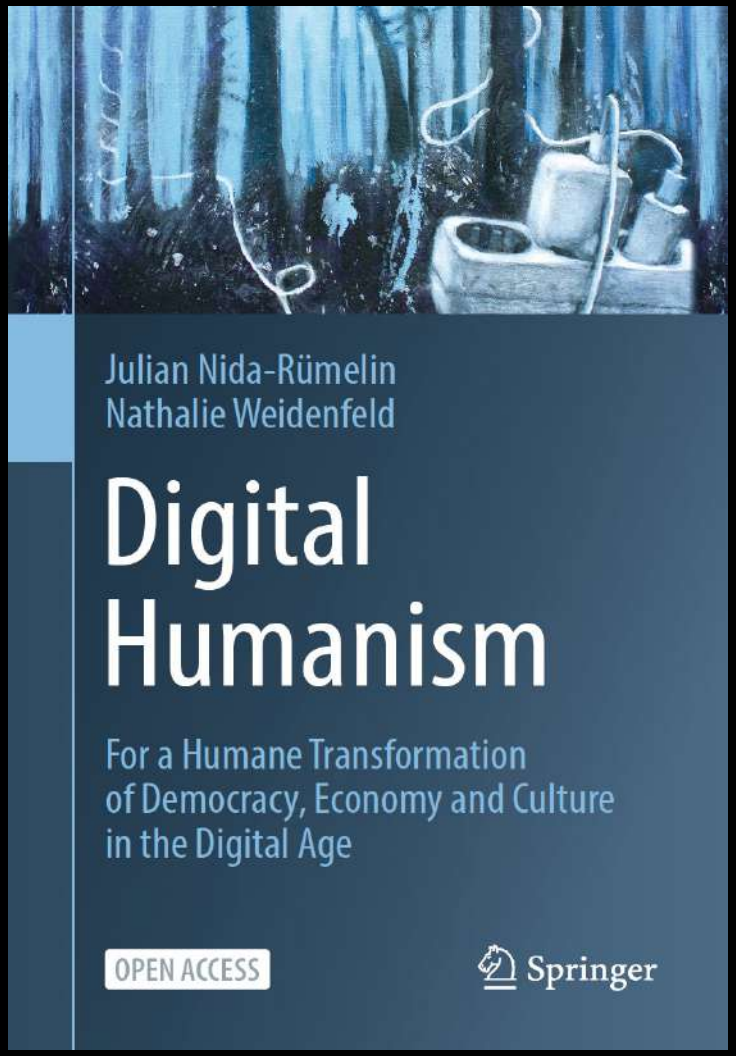
Open Access



Hannes Werthner, Carlo Ghezzi, Jeff Kramer, Julian Nida-Rümelin, Bashar Nuseibeh, Erich Prem, and Allison Stanger (eds): **Introduction to Digital Humanism**, Springer, 2024. https://link.springer.com/book/10.1007/978-3-030-86144-5

Digital Humanism – For a Humane Transformation Of Democracy, Economy, and Culture in the Digital Age

Open Access



Julian Nida-Rümelin, Nathalie Weidenfeld (eds): **Digital Humanism.** For a Humane Transformation of Democracy, Economy and Culture in the Digital Age, Springer, 2022. https://link.springer.com/book/10.1007/978-3-031-12482-2

Digital Humanism Lecture Series

https://dighum.ec.tuwien.ac.at/news-events/

https://www.youtube.com/@DigitalHumanism Youtube channel
(Stuart Russel, Gary Marcus, Edward Lee, Deborah G. Johnson, Julian Nida-Rümelin,…)

Digital Humanism Manifesto

“Today, we experience the co-evolution of technology and humankind.
The flood of data, algorithms, and computational power is disrupting the very fabric of society by changing human interactions, societal institutions, economies, and political structures.
Science and the humanities are not exempt. This disruption simultaneously creates and threatens jobs, produces and destroys wealth,
and improves and damages our ecology. It shifts power structures, thereby blurring the human and the machine.”

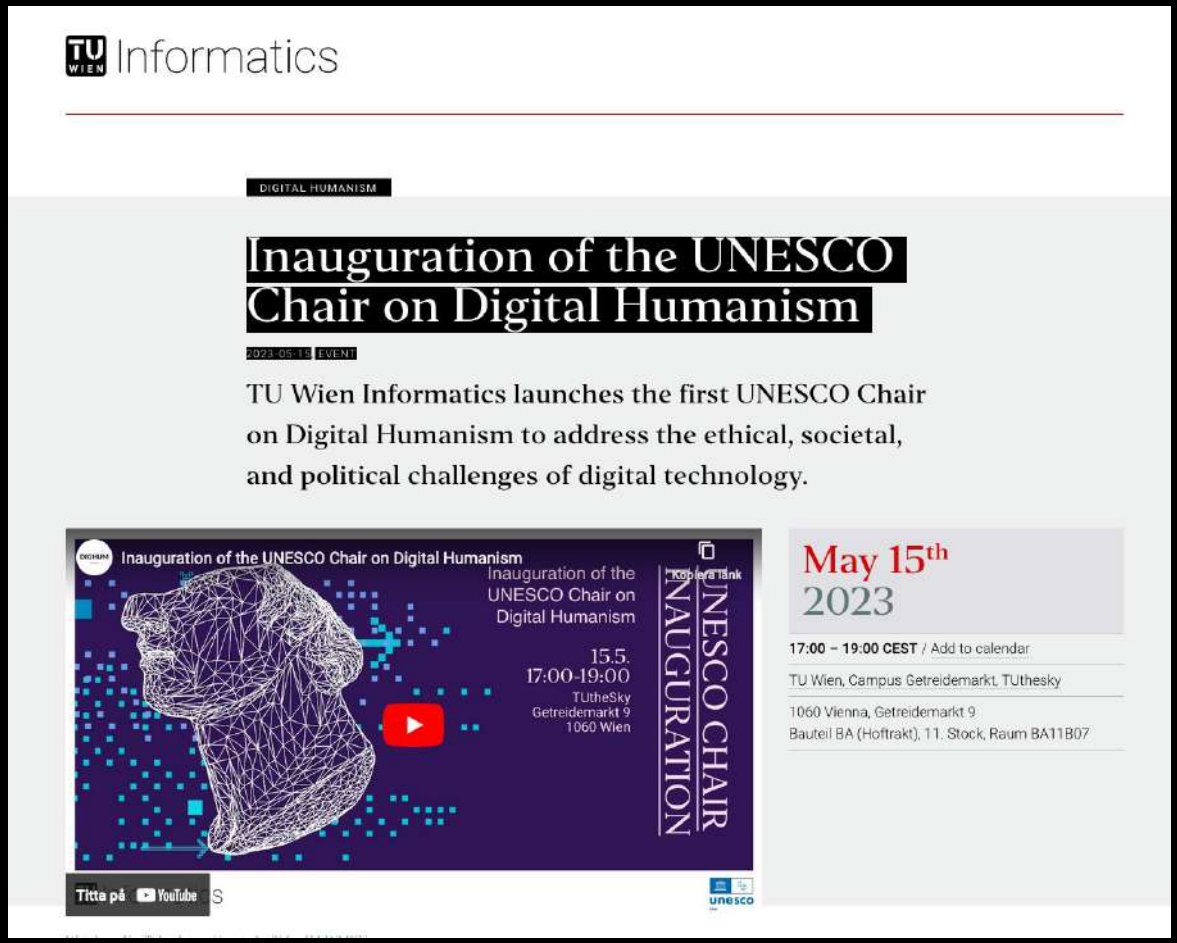
https://dighum.ec.tuwien.ac.at/dighum-manifesto/

Viable Initiatives in a Hyperconnected, Dynamic, Emergent World

https://medium.com/@bill.bannear/the-new-zeitgeist-relationships-and-emergence-e8359b934e0

UNESCO Chair on Digital Humanism

Peter Knees Chair and Julia Neidhardt Co-Chair

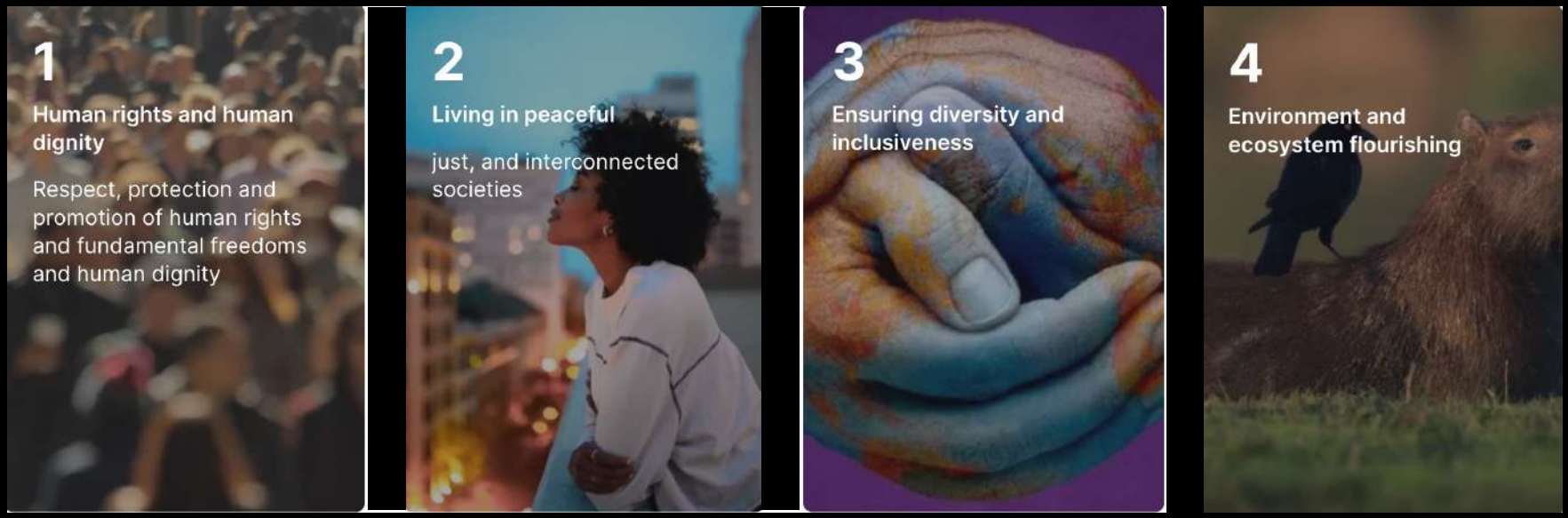


"UNESCO uses education, science, culture, communication and information to foster mutual understanding and respect for our planet."

CAIML - Center for Artificial Intelligence and Machine Learning. https://www.tuwien.at/caiml/

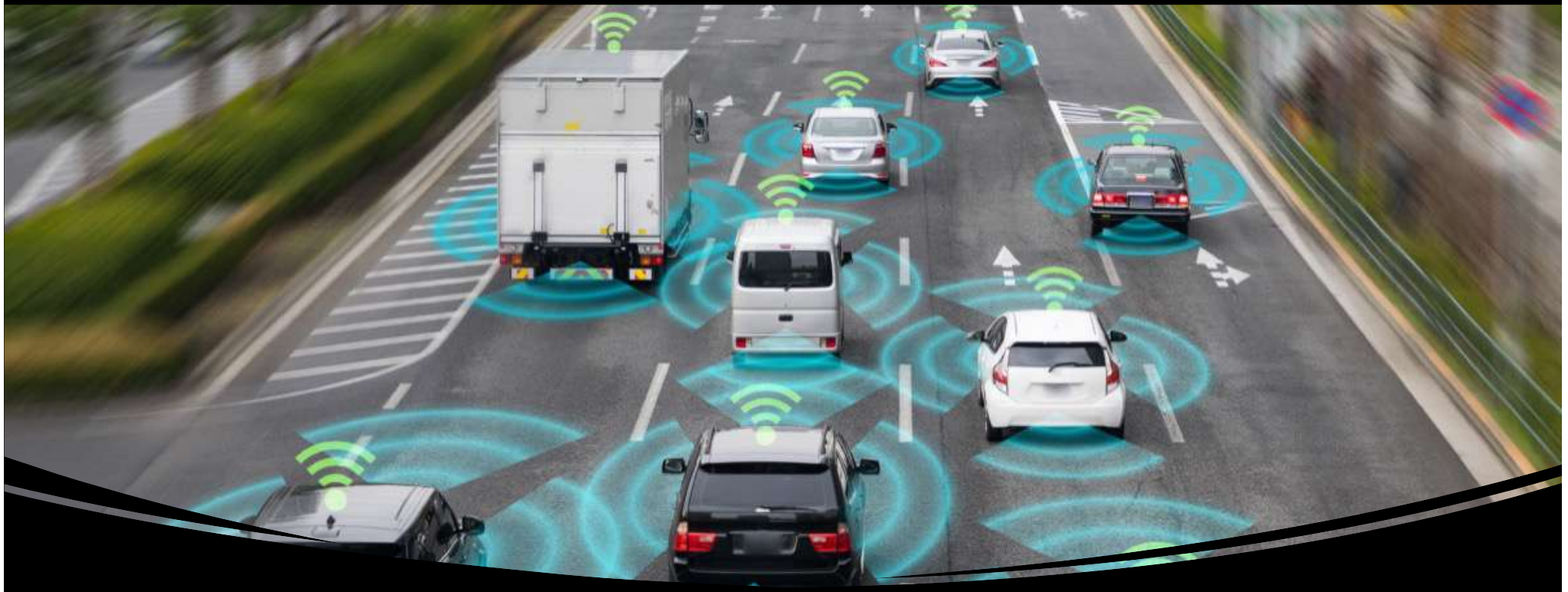
https://informatics.tuwien.ac.at/stories/2383

UNESCO ‘Recommendation on the Ethics of Artificial Intelligence’



https://www.unesco.org/en/artificial-intelligence/recommendation-ethics

Case study - Autonomous Cars Ethics



Autonomous cars

As a special case of intelligent emerging technology

Book chapter:
"Steps Towards Real-world Ethics for Self-driving Cars: Beyond the Trolley Problem".

Holstein, T., Dodig-Crnkovic, G., & Pelliccione, P. (2021). In Steven John Thompson (Ed.), Machine Law, Ethics, and Morality in the Age of Artificial Intelligence. IGI Global

Picture: https://www.aarete.com/insights/what-is-the-business-case-for-autonomous-vehicles-in-the-supply-chain/

Safety

Challenges

- Hardware and software adequacy
- Vulnerabilities of machine-learning algorithms
- Control of trade-offs between safety and other factors (like economic) in the design, manufacturing and operation
- Possibility of intervention in case of major failure of the system and graceful degradation
- Systemic solutions to guarantee safety in organizations (regulations, authorities, safety culture)

Approaches

- Setting safety as the first priority
- Learning from the history of automation
- Learning from experience of current use
- Specification of how a system will behave in cases when autonomous operation is disabled (safe mode)
- Preparedness for handling “loss of control” situations- autonomous systems running amok
- Regulations, guidelines, standards being developed as the technology develops

Security

Challenges

- Minimal necessary security requirements for deployment of the system
- Security in the context and connections
- Deployment of software updates
- Storing and using received and generated data in a secure way

Approaches

- Technical solutions to guarantee minimum security under all foreseeable circumstances
- Anticipation and prevention of the worst-case scenarios
- Accessibility of data, even in the case of accidents, learning from experience

Non-maleficence

Challenges

- Risk of technology causing harm, physical, cognitive, psychological, social, etc.
- Disruptive changes in the labor market
- Transformation of related businesses, markets, and business models (manufacturers, insurance, etc.)
- Loss of human skills
- Loss of autonomy

Approaches

- Partly covered by technical solutions, but interdisciplinary approaches are needed
- Preparation of strategic solutions for people losing jobs
- Learning from historic parallels to industrialization and automatization

Responsibility and Accountability

Challenges

- Assignment and distribution of responsibility and accountability as some of central regulative mechanisms for the development of new technology

Approaches

- The Accountability, Responsibility, and Transparency (ART) principle (Virginia Dignum) based on a Design for Values approach that includes human values and ethical principles in the design processes

Stakeholders Interests

Humans in the loop

Freedom of choice

To what extent will the user be in control?

Will the AI do, what I want it to do?

Implementation of restrictions

Loss of jobs compensation

Impacts on society as a whole

Social Trust

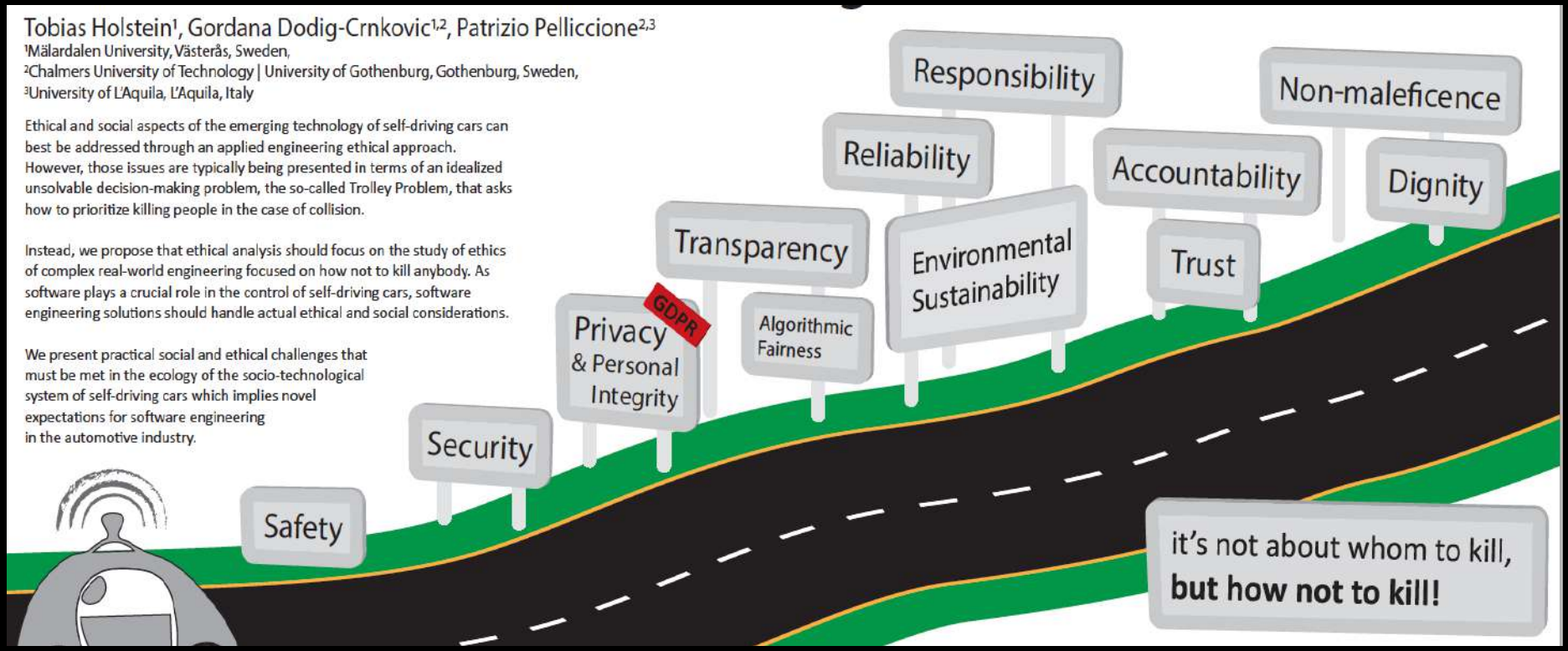
Challenges

- Establishing trust between humans and robots as well as within the social system involving robots

Approaches

- Further research on how to implement trust across multiple systems
- Provision of trusted connections between components as well as external services

Value-based Ethical Guidelines for Self-Driving Cars



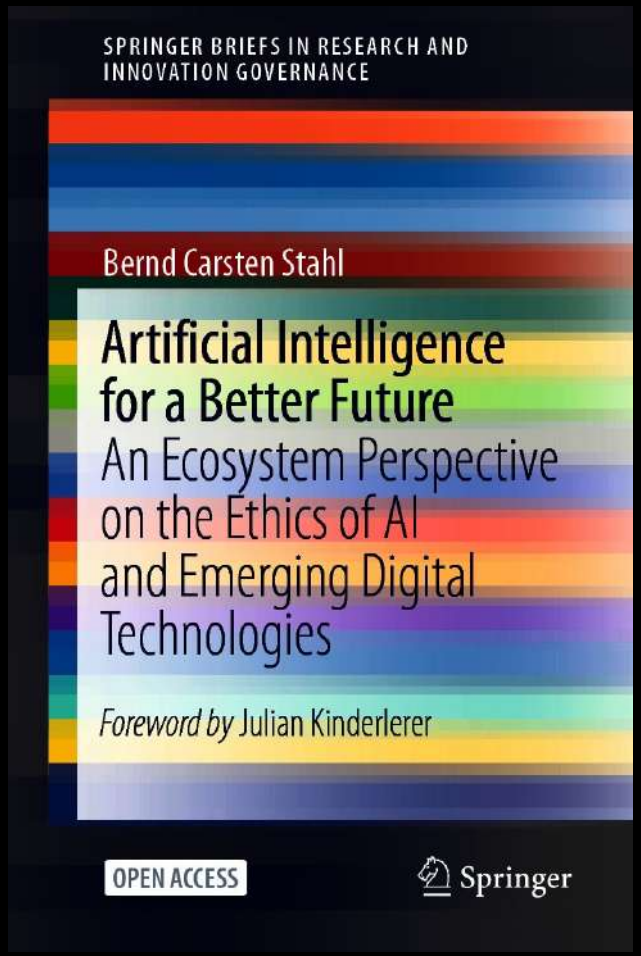
Ehics of Self-Driving Cars

Presented at major SE conference ICSE2020 as poster

Extended version in a book chapter:

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

Our Future with AI



AI FOR A BETTER FUTURE

An Ecosystem Perspective
on the Ethics of AI
and Emerging Digital Technologies

Bernd Carsten Stahl

https://link.springer.com/book/10.1007/978-3-030-69978-9 OPEN ACCESS

Organizational Ethical Issues of AI

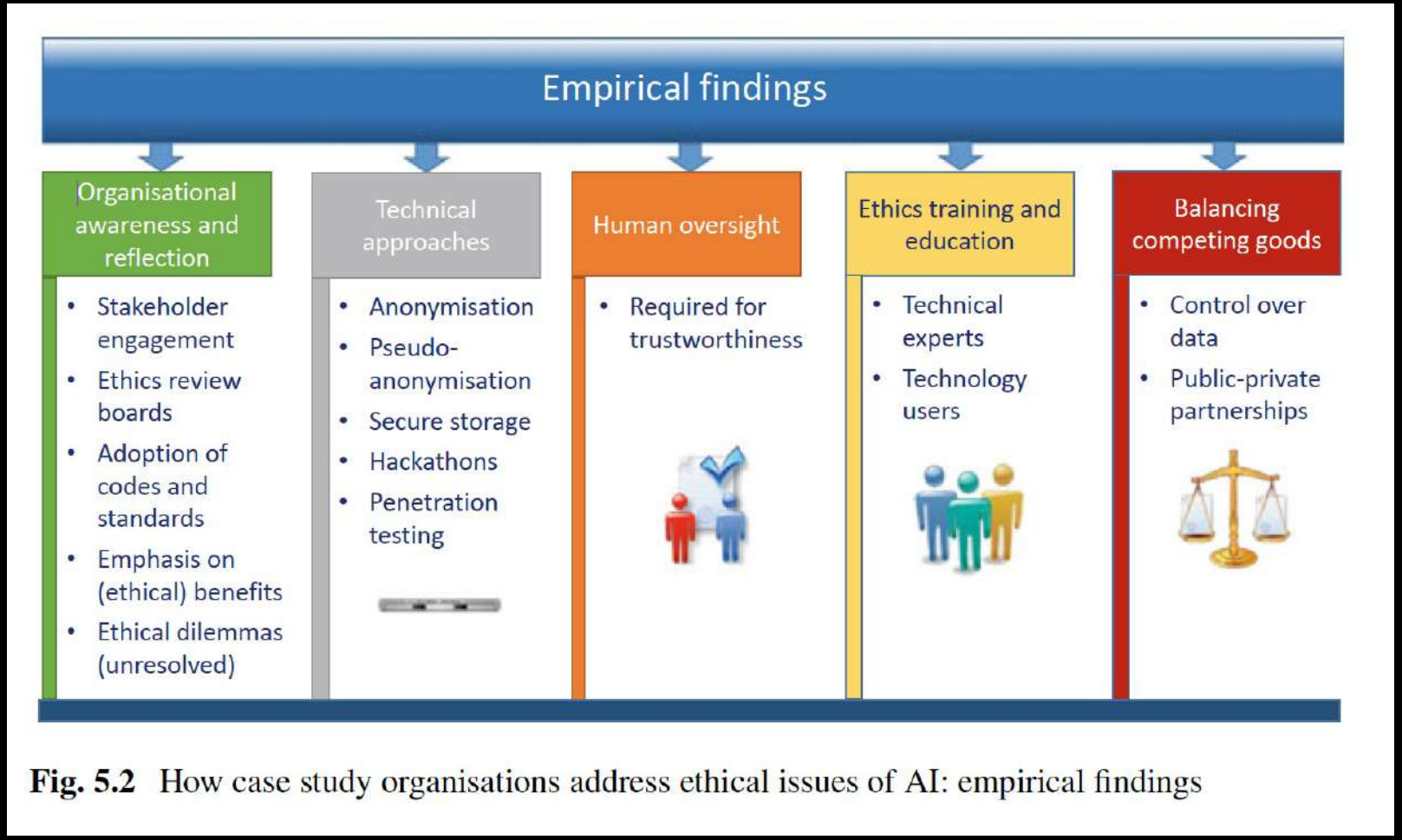
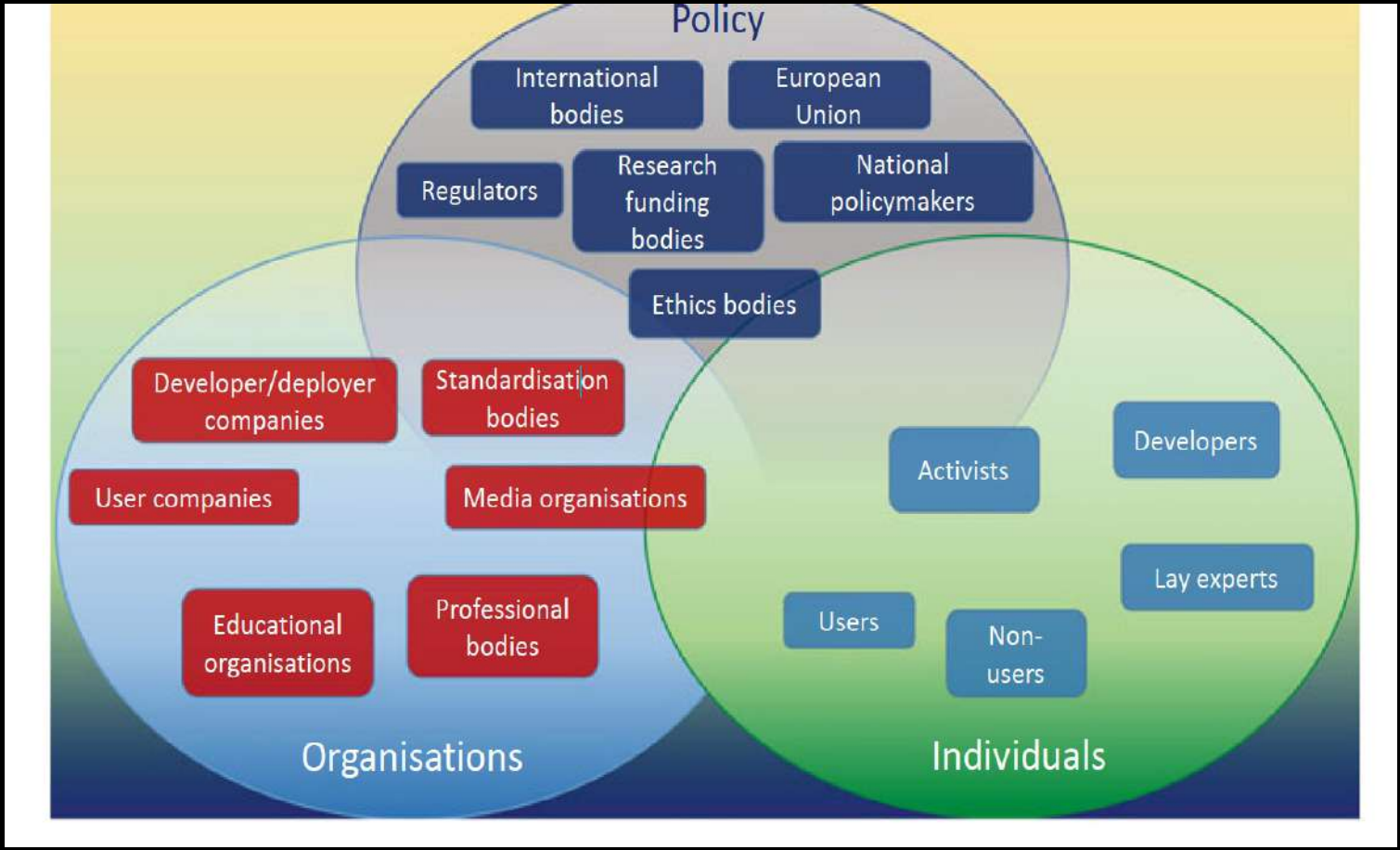


Fig. 5.2 How case study organisations address ethical issues of AI: empirical findings

Bernd Carsten Stahl (2021) Artificial Intelligence for a Better Future, An Ecosystem Perspective on the Ethics of AI and Emerging Digital Technologies https://link.springer.com/book/10.1007%2F978-3-030-69978-9

Overview of AI stakeholders



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Key Challenges of Ethical Governance of AI

Fig. 7.1 Key challenges of ethical governance of AI ecosystems

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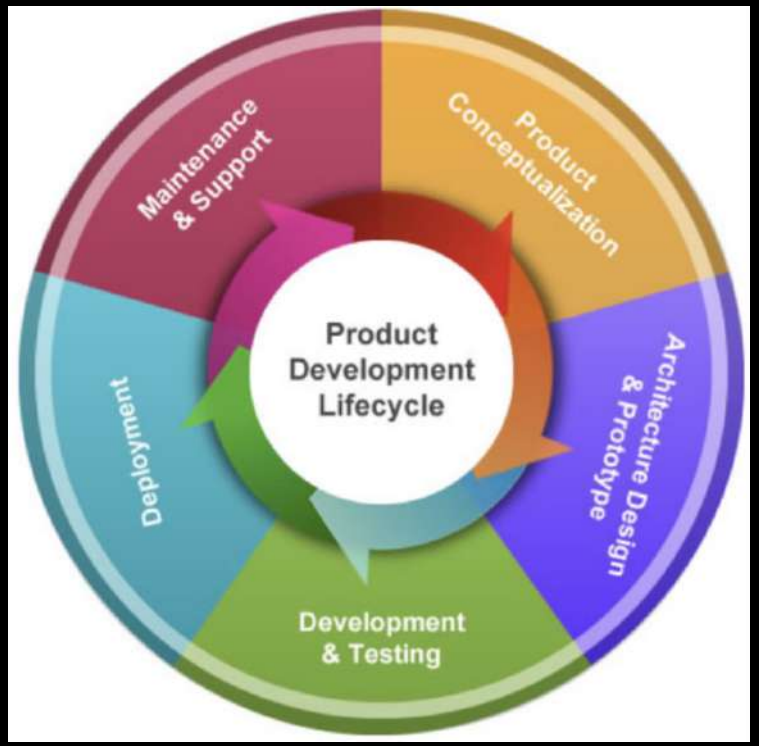
Practical Use of the Proposed Ethical Program for Intelligent Emergent Technologies -

Importance of Transdisciplinarity and Transversal Knowledge

Ethical requirements must be fulfilled in all phases in the life-cycle of technology, in the context of:

- Conceptualization/Design/Prototyping/ Construction/Development/Testing/Production
- Deployment/Application/
- Maintenance/Support
- Oversight/Regulation



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Challenges for Emergent Technologies

Legislation	Global framework	Guidelines	Implementation
Keeping legislation up-to-date with current level of automated driving, and emergence of self-driving cars	Creating and defining global legislation frameworks for the implementation of interoperable and development of increasingly automated vehicles	Defining the guidelines that will be adopted by society for building self-driving cars	Including ethical guidelines in design and development processes

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Building Ethical Technology in an Ethical Way

Work on the shared vision of emergent technologies.

Anticipation and consideration of uncertainties/Speculative design

A system-level approach involving the entire software-hardware system as well as human stakeholders, with organizational, and social factors.

Multi-criteria decisions. Multidisciplinary approach.

Learning from experience from the whole life cycle of technology.

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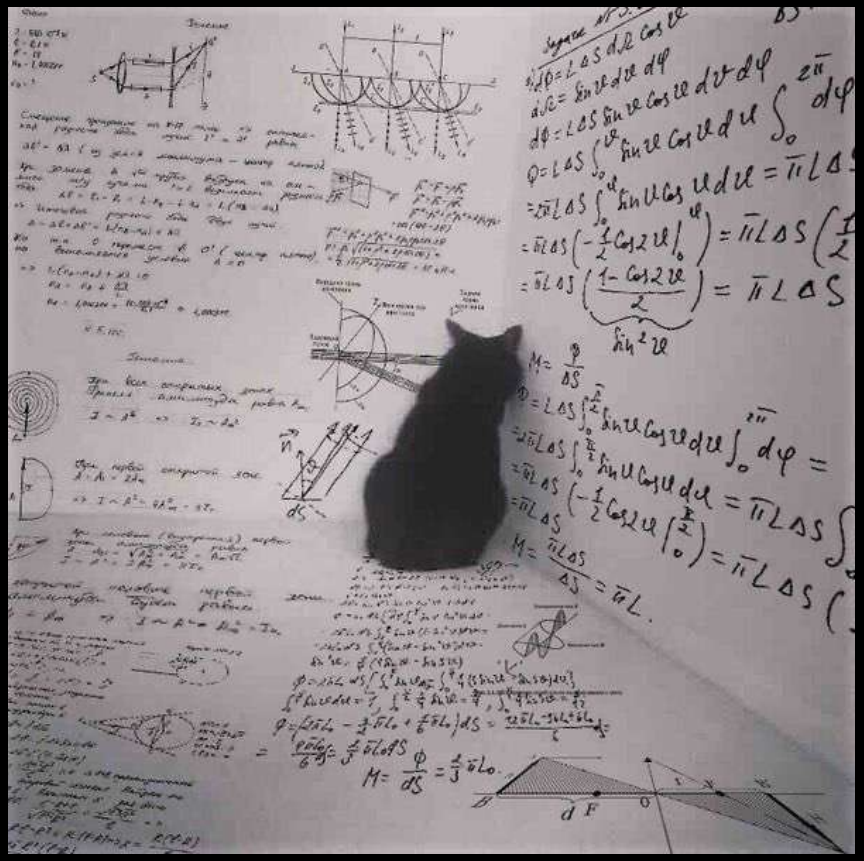
Wrap-up

The main topics we visited during this talk

- Navigating Possible Futures: Speculative Design
- A White Water World & Emergence in Ecologies of Change
- Value-based Human-centric Design
- Digital Humanism
- Case Study: Ethics of Autonomous Cars

As AI technology becomes more and more powerful, the age-old adage applies: "With great power comes great responsibility."

The perspective of Digital Humanism was presented as a way of approaching the contemporary white-water world, driven by the prospect of a more humane and inclusive future.



Q & A TIME!

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