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# ETHICS OF ARTIFICIAL INTELLIGENCE

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18th November 2021

https://www.youtube.com/watch?v=GboOXAjGevA&feature=emb_logo Hewlett Packard enterprise - Moral Code: The Ethics of AI (8:03)

# ARTIFICIAL INTELLIGENCE & NATURAL INTELLIGENCE

Definition of AI:

"The theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages."

The English Oxford Living Dictionary

Also, most importantly:
learning and meta-learning (learning to learn)

TYPES OF INTELLIGENCE: NATURAL, ARTIFICIAL, MIX (LIKE CYBORGS)


# LECTURE PLAN FOR TODAY

- Introduction on intelligence, natural and artificial
- Design of intelligent artifacts
- Value-sensitive design
- Responsible AI
- Different initiatives for ethical AI
- Summary: ethics of AI

Break

- Group work: Discussions in breakout rooms
- Geting together with short accounts from group work

# INTRODUCTION

https://www.iconfinder.com/iconsets/brain-service-2

# TYPES OF INTELLIGENCE

EMBODIED: HUMAN, CYBORG, ROBOT

DISEMBODIED: SOFTWARE, INFRASTRUCTURE

GENERAL/STRONG: HUMAN LEVEL AND ABOVE

NARROW/ WEAK: PRESENT INTELLIGENT ARTIFACTS

# DIGITALIZATION & COGNITIZATION

## INTELLIGENCE & ARTIFICIAL INTELLIGENCE

- Digitalization happens in parallel with introduction of cognitive properties and intelligence into artifacts
- Ethical implications of the digitization of our society: new technologies are followed by **regulatory and legal vacuums** (James Moore)
- My background: theoretical physics, computer science, philosophy of computing and ethics, computational models of cognition, recent interest: interaction design – Interdisciplinary elucidation of AI.

# DESIGN OF INTELLIGENT ARTIFACTS

https://www.iconfinder.com/iconsets/brain-service-2

# INTELLIGENT ARTIFACTS BEING DEVELOPED

- Ambient intelligence
- Autonomous Intelligent Systems
- Intelligent Robots & Softbots
- Intelligent transportation
- Intelligent Cities
- Intelligent IoT
- Decision Making Algorithms
  (introduced into particular technologies as self-driving vehicles but also into democratic institutions of governance, law, etc.)

https://bitcoinist.com/crypto-mining-becoming-concern-us-cities/

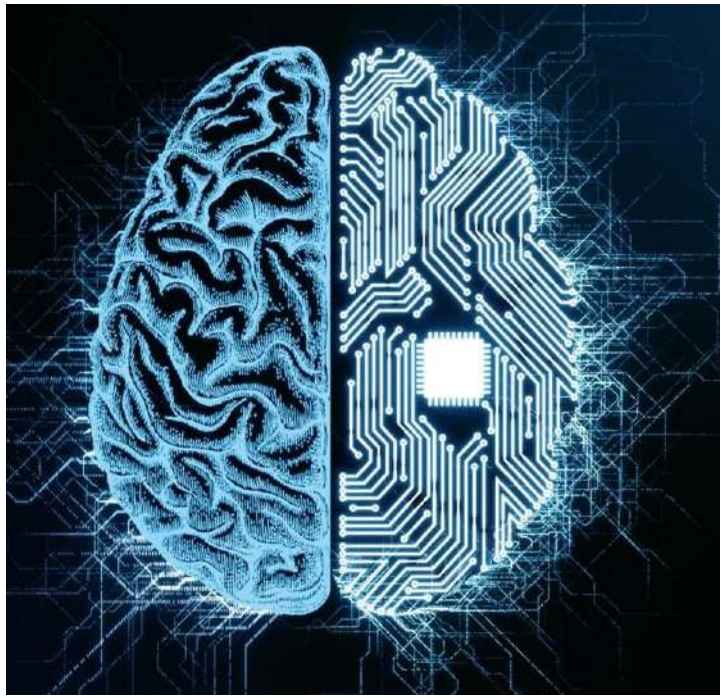
# DESIGN OF INTELLIGENT ARTIFACTS

- Intelligent Health-Care Systems
- Intelligent Personalized Medicine
- Cognitive Enhancements

Theodore Berger (University of Southern California, L.A.) Engineering Memories: A Cognitive Neural Prosthesis for Restoring and Enhancing Memory Function

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3141091/

https://www.technologyreview.com/s/513681/memory-implants/



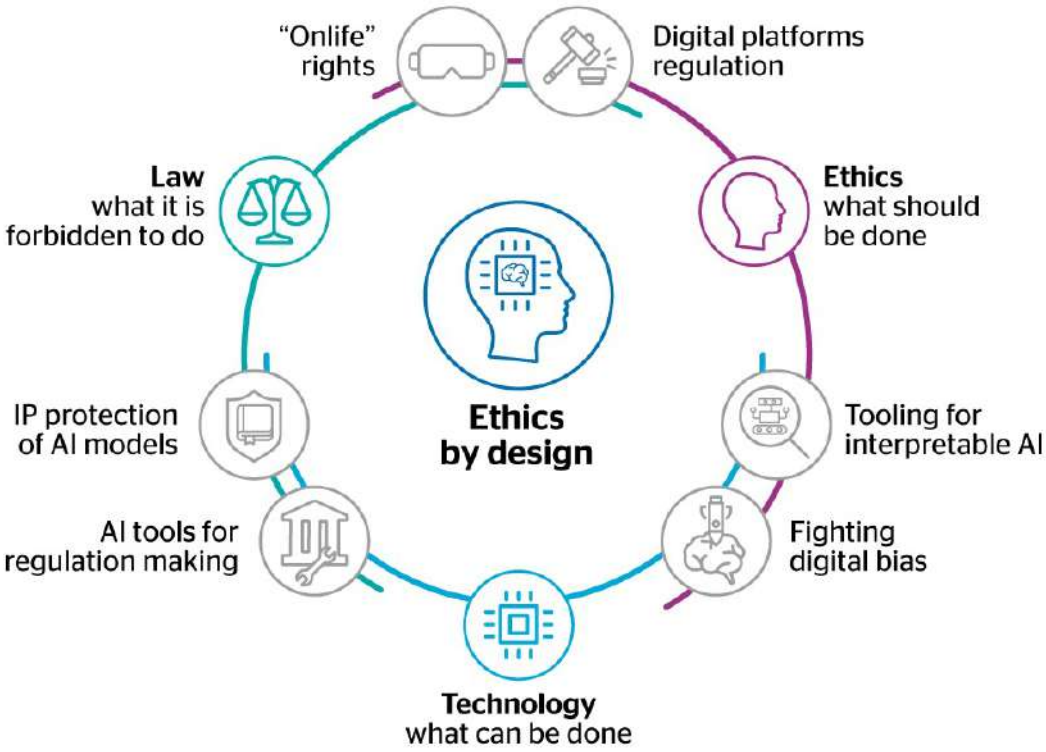
https://www.pbs.org/wgbh/nova/video/nova-wonders-can-we-build-a-brain/

# RECURRENT PATTERN: Inspiration FROM NATURE (INTELLIGENCE) QUESTION: HOW MUCH DO WE KNOW ABOUT NATURE?

milar to the way antibodies are able to modify the responses of blood cells to
nart services will adjust their behavior according to their ecosystem's operatin

# DO WE WANT INTELLIGENT EVERYTHING?

# WHY? QUESTION OF VALUES & ETHICS




https://atos.net/content/mini-sites/journey-2022/human-centric-ai/

# VALUE-SENSITIVE DESIGN

https://www.iconfinder.com/iconsets/brain-service-2

# VALUE-SENSITIVE DESIGN

- Value-sensitive design (VSD) holds that artefacts are value-laden and design can be value-sensitive. The approach refers to the need to identify early implicit values embedded in new technologies by focusing on the usage situations of technology.
- "Value" is defined broadly as property that a person or a group considers important in life, and designers can intentionally inscribe their values in the design objects thus shaping them.
- The design is carried out iteratively by combining the following approaches supporting the values:

- conceptual (conceptions of values for users and stakeholders)
- empirical (how values are realized in practice)
- technical (design of technology),
- research all of which is followed by
- assessment

Luciano Floridi, Josh Cowls, Thomas C. King, Mariarosaria Taddeo (2020) How to Design AI for Social Good: Seven Essential Factors. Science and Engineering Ethics. https://doi.org/10.1007/s11948-020-00213-5

# VALUE-SENSITIVE DESIGN

| Ethical values and principles in European discussion | | | |
|---|---|---|---|
| Expert Group/ Publication | Ethical Value/Principle | Context | Technology |
| Friedman et al. (2003; 2006) [1,2] | Human welfare<br>Ownership and property<br>Freedom from bias<br>Universal usability<br>Courtesy<br>Identity<br>Calmness<br>Accountability<br>(Environmental) sustainability | Value-sensitive design | ICT |
| Ethically Aligned Design (EAD) IEEE Global initiative (2016, 2017) [3,4] | Human benefit<br>Responsibility<br>Transparency<br>Education and Awareness | Global Initiative for Ethical Considerations in Artificial Intelligence and Autonomous Systems: Insights and recommendations for the AI/AS technologists and for IEEE standards | AI/AS |

# VALUE-SENSITIVE DESIGN

| Ethical values and principles in European discussion | | | |
|---|---|---|---|
| Asilomar AI Principles (2017) [5] | Safety<br>Failure and juridical transparency<br>Responsibility<br>Values, alignment<br>Privacy and liberty<br>Shared benefit and prosperity<br>Human control<br>Non-supervision<br>Avoiding arms race | Beneficial AI to guide the development of AI | AI |
| The European Group on Ethics in Science and New Technologies (EGE) (2017) [6] | Human dignity<br>Autonomy<br>Responsibility, Accountability<br>Security, Safety<br>Justice, Equality and solidarity<br>Democracy<br>Bodily and mental integrity<br>Data protection and privacy<br>Sustainability | Statement on Artificial Intelligence, Robotics and Autonomous Systems | AI, Robotics, AS |

# VALUE-SENSITIVE DESIGN

| Ethical values and principles in European discussion | | | |
|---|---|---|---|
| European Commission's High-Level Expert Group on Artificial Intelligence (AI HLEG) (2018) [7] | Respect for human dignity<br>Freedom of the individual<br>Respect for democracy, justice and the rule of law<br>Equality, non-discrimination and solidarity<br>Citizens rightsBeneficence: "Do Good"<br>Non maleficence: "Do no Harm"<br>Autonomy: "Preserve Human Agency"<br>Justice: "Be Fair"<br>Explicability: "Operate transparently" | Trustworthy AI made in Europe | AI |
| AI4People (2018) [8] | Beneficence<br>Non-maleficence<br>Autonomy<br>Justice<br>Explicability | An ethical framework for a good AI society | AI |

https://digital-strategy.ec.europa.eu/en/policies/european-approach-artificial-intelligence#Coordinated-EU-Plan-on-Artificial-Intelligence

# VALUE-SENSITIVE DESIGN

| A preliminary set of ethical values for the context of Autonomous Intelligent Systems | |
|---|---|
| Integrity and Human Dignity | Individuals should be respected, and AIS solutions should not violate their dignity as human beings, their rights, freedoms and cultural diversity. AIS (Autonomous Intelligent Systems) should not threaten a user's physical or mental health. |
| Autonomy | Individual freedom and choice. Users should have the ability to control, cope with and make personal decisions about how to live on a day-to-day basis, according to one's own rules and preferences. |
| Human control | Humans should choose how or whether to delegate decisions to AIS, to accomplish human-chosen objectives. |
| Responsibility | Concerns the role of people and the capability of AIS to answer for the decisions and to identify errors or unexpected results. AIS should be designed so that their affects align with a plurality of fundamental human values and rights. |

# VALUE-SENSITIVE DESIGN

| A preliminary set of ethical values for the context of Autonomous Intelligent Systems | |
|---|---|
| Justice, equality, fairness and solidarity | AIS should contribute to global justice and equal access. Services should be accessible to all user groups irrespective any physical or mental deficiencies. This principle of (social) justice goes hand in hand with the principle of beneficence: AIS should benefit and empower as many people as possible. |
| Transparency | If an AIS causes harm, it should be possible to ascertain why. The mechanisms through which the AIS makes decisions and learns to adapt to its environment should be described, inspected and reproduced. Key decision processes should be transparent and decisions should be the result of democratic debate and public engagement. |
| Privacy | People should have the right to access, manage and control the data they generate. |

# VALUE-SENSITIVE DESIGN

| A preliminary set of ethical values for the context of Autonomous Intelligent Systems | |
|---|---|
| Reliability | AIS solutions should be sufficiently reliable for the purposes for which they are being used. Users need to be confident that the collected data is reliable, and that the system does not forward the data to anyone who should not have it. |
| Safety | Safety is an emerging property of a socio-technical system, which is created daily by decisions and activities. Safety of a system should be verified where applicable and feasible. Need to consider possible liability and insurance implications. |
| Security | AI should be secure in terms of malicious acts and intentional violations (unauthorized access, illegal transfer, sabotage, terrorism, etc.). Security of a system should be verified where applicable and feasible. |
| Accountability | Decisions and actions should be explained and justified to users and other stakeholders with whom the system interacts. |

# VALUE-SENSITIVE DESIGN

| A preliminary set of ethical values for the context of Autonomous Intelligent Systems | |
|---|---|
| Explicability | Also 'explainability'; necessary in building and maintaining citizen's trust (captures the need for accountability and transparency), and the precondition for achieving informed consent from individuals. |
| Sustainability | The risks of AIS being misused should be minimized: Awareness and education. "Precautionary principle": Scientific uncertainty of risk or danger should not hinder to start actions of protecting the environment or to stop usage of harmful technology. |
| Role of technology in society | Governance: Society should use AIS in a way that increases the quality of life and does not cause harm to anyone. Depending on what type of theory of justice a society is committed to, it may stress e.g., the principle of social justice (equality and solidarity), or the principle of autonomy (and values of individual freedom and choice). |

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2. Friedman, B.; Kahn, P.H., Jr.; Borning, A. (2006) Value sensitive design and information systems. In Human-Computer Interaction in Management Information Systems: Applications; M.E. Sharpe, Inc.: New York, NY, USA; Volume 6, pp. 348–372.

3. IEEE Global Initiative for Ethical Considerations in Artificial Intelligence and Autonomous Systems. Ethically Aligned Design, Version One – For Public Discussion (2016) A Vision for Prioritizing Human Wellbeing with Artificial Intelligence and Autonomous Systems https://standards.ieee.org/content/dam/ieee-standards/standards/web/documents/other/ead_v1.pdf

4. IEEE Global Initiative on Ethics of Autonomous and Intelligent Systems. Ethically Aligned Design, Version 2 for Public Discussion (2017) A Vision for Prioritizing Human Well-Being with Autonomous and Intelligent Systems. Available online: https://standards.ieee.org/content/dam/ieee-standards/standards/web/documents/other/ead_v2.pdf

5. AlgorithmsWatch. AI Ethics Guidelines Global Inventory. https://inventory.algorithmwatch.org 2020.

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5. Asilomar Conference 2017. Asilomar AI Principles. Available online: https://futureoflife.org/ai-principles/?cn-reloaded=1

6. European Group on Ethics in Science and New Technologies (2018) Statement on Artificial Intelligence, Robotics and 'Autonomous' Systems. Available online: https://ec.europa.eu/research/ege/pdf/ege_ai_statement_2018.pdf

7. European Commission's High-Level Expert Group on Artificial Intelligence. Draft Ethics Guidelines for Trustworthy AI (2019) Available online: https://ec.europa.eu/digital-single-market/en/news/draft-ethics-guidelines-trustworthy-ai

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9. Spiekermann, Sarah and Winkler, Till, Value-based Engineering for Ethics by Design (May 12, 2020). Available at SSRN: https://ssrn.com/abstract=3598911 or http://dx.doi.org/10.2139/ssrn.3598911

10. Sarah Spiekermann (2015) Ethical IT Innovation: A Value-Based System Design Approach CRC Press https://www.amazon.com/Ethical-Innovation-Value-Based-System-Approach/dp/1482226359


All links accessed on 16 September 2021

# RESPONSIBLE AI

Based on the lecture:
Responsible Artificial Intelligence, Virginia Dignum,
https://www.youtube.com/watch?v=BqwVRzKVz30

Dignum, Virginia. Responsible artificial intelligence:
How to develop and use AI in a responsible way.
Springer Nature, 2019. (Book)

https://www.iconfinder.com/iconsets/brain-service-2

# RESPONSIBLE AI: WHY CARE?

- AI systems are designed to act autonomously in our world (in the future)
- Eventually, AI systems will make *better* decisions than humans in specific well-defined domains

**AI is designed, it is an artefact**

- We need to be sure that the purpose put into the machine is the purpose which we really want

*Norbert Wiener, 1960 (Stuart Russell)  King Midas, c540 BCE*

Based on: Responsible Artificial Intelligence, Virginia Dignum, https://www.youtube.com/watch?v=BqwVRzKVz30

# ETHICS & DESIGN

## Ethics in Design

- Ensuring that development processes take into account ethical and societal implications of AI as it integrates and replaces traditional systems and social structures

## Ethics by Design

- Integration of ethical reasoning abilities as part of the behaviour of artificial autonomous systems

## Ethics for Design(ers)

- Research integrity of researchers and manufacturers, and certification mechanisms

Based on: Responsible Artificial Intelligence, Virginia Dignum, https://www.youtube.com/watch?v=BqwVRzKVz30

# ETHICS IN DESIGN: AI – DOING IT RIGHT

Principles for Responsible AI = ART

Accountability

Responsibility

Transparency

Based on: Responsible Artificial Intelligence, Virginia Dignum, https://www.youtube.com/watch?v=BqwVRzKVz30

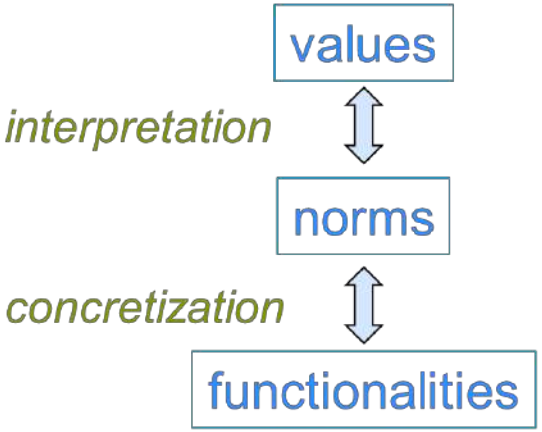
# ETHICS IN DESIGN: AI – DOING IT RIGHT

Principles for Responsible AI = ART

Accountability
- Explanation and justification
- Design for values

Responsibility

Transparency




Based on: Responsible Artificial Intelligence, Virginia Dignum, https://www.youtube.com/watch?v=BqwVRzKVz30

# ETHICS IN DESIGN: AI – DOING IT RIGHT

## Principles for Responsible AI = ART

Accountability
- Explanation and justification
- Design for values

Responsibility
- Autonomy
- Chain of responsible actors
- Human-like AI

Transparency


Based on: Responsible Artificial Intelligence, Virginia Dignum, https://www.youtube.com/watch?v=BqwVRzKVz30

# ETHICS IN DESIGN: AI – DOING IT RIGHT

## Principles for Responsible AI = ART

Accountability
- Explanation and justification
- Design for values

Responsibility
- Autonomy
- Chain of responsible actors
- Human-like AI

Transparency
- Data and processes
- Algorithms
- Choices and decisions

Based on: Responsible Artificial Intelligence, Virginia Dignum, https://www.youtube.com/watch?v=BqwVRzKVz30

# ETHICS BY DESIGN

- Can AI artefacts be build to be  ethical?
- What does that mean?
- What is needed?

- Understanding ethics
- Using ethics
- Being ethical


Based on: Responsible Artificial Intelligence, Virginia Dignum, https://www.youtube.com/watch?v=BqwVRzKVz30

# ETHICAL REASONING IS OPEN-ENDED


## Normative reasoning (Trolley Problem/Moral Machine)

## Utilitarian/Consequestialist car

Consequentialism in ethics is the view that whether or not an action is good or bad depends solely on what **effects** that action has on the world.
"The greatest amount of good for the greatest amount of people". The only valuable consequence is pleasure, and the only disvaluable consequence is pain. The best for the most; results matter

## Deontologic/Kantian car

Human-centric, Duty ethics. Good and evil reside in the individual's **intentions** rather than in the **consequences** of the act

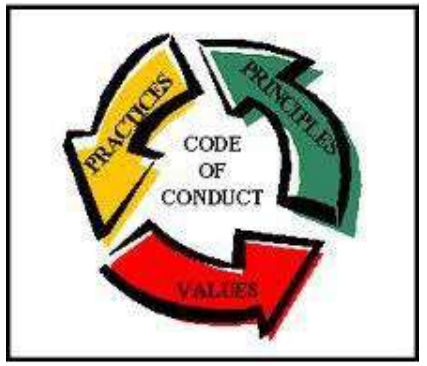
## Aristotelian car

Aristotle's ethics is about how to live the good life (eudaimonia) based on virtues.
Act as a virtuous person. For Aristotle, there are three primary moral virtues: courage, temperance, and justice.

Based on: Responsible Artificial Intelligence, Virginia Dignum, https://www.youtube.com/watch?v=BqwVRzKVz30

# ETHICS FOR DESIGN(ERS) – REGULATION, CODES OF CONDUCT

- A code of conduct clarifies mission, values and principles, linking them with standards and regulations
  - Compliance
  - Risk mitigation
  - Marketing
- Many professional groups have regulations
  - Medicine / Pharmacy
  - Accountants
  - Architects
  - Military
- Regulation, accreditation: when society relies on a profession!




Based on: Responsible Artificial Intelligence, Virginia Dignum, https://www.youtube.com/watch?v=BqwVRzKVz30

# TAKE AWAY MESSAGE ON RESPONSIBLE AI

- (Currently) AI systems are artefacts built by us for our own purposes
  - Our decision, our responsibility
- AI influences and is influenced by our social systems
  - Design in never value-neutral
  - Society shapes and is shaped by design
- Knowing ethics is not being ethical
  - Not for us and not for machines
  - Different ethics – different decisions (Stakeholders agreement needed)
- Artificial Intelligence needs ART
  - Accountability, Responsibility, Transparency
  - (Stakeholders must) Be explicit!

Based on: Responsible Artificial Intelligence, Virginia Dignum, https://www.youtube.com/watch?v=BqwVRzKVz30

# RESPONSIBLE ARTIFICIAL INTELLIGENCE

WE ALL ARE RESPONSIBLE STAKEHOLDERS

in different ways

in different roles

Based on: Responsible Artificial Intelligence, Virginia Dignum, https://www.youtube.com/watch?v=BqwVRzKVz30

# DIVISION/ASSIGNMENT OF RESPONSIBILITY

## Time perspective

- Short-term perspective
  (We decide)
- Middle-term perspective
  (AGI – We co-decide)
- Long-term perspective
  (Superintelligence? Who decides?)

## Stakeholders roles

- Politicians
- Legislators
- Business
- Developers, Designers
- Programmers
- Deployment, test
- Maintenance
- Learning from experience
- Feedback to development & design

# PROFESSIONAL ETHICISTS ON AI ETHICS

**Vincent C. Müller** (forthcoming), 'Ethics of artificial intelligence and robotics', in Edward N. Zalta (ed.), Stanford Encyclopedia of Philosophy (Palo Alto: CSLI, Stanford University). tiny.cc/1tnvez

**Judith Simon**
https://www.youtube.com/watch?v=cvLltFoJme0 Judith Simon - Big data & machine learning

https://www.youtube.com/watch?v=mNhuriIZLcI Judith Simon - DataBust: Dissecting Big Data Practices and Imaginaries

**Mark Coeckelbergh** (2020) AI Ethics. MIT Press Essential Knowledge

**Luciano Floridi** & Cowls, Josh. (2019). A Unified Framework of Five Principles for AI in Society. Harvard Data Science Review. 10.1162/99608f92.8cd550d1.
Floridi, L. The AI4People's Ethical Framework for a Good AI Society https://www.eismd.eu/wp-content/uploads/2019/03/AI4People%E2%80%99s-Ethical-Framework-for-a-Good-AI-Society.pdf

**Rafael Capurro (2019)** THE AGE OF ARTIFICIAL INTELLIGENCES. Contribution to the AI, Ethics and Society Confererence, University of Alberta, Edmonton (Canada), May 8-10, 2019. http://www.capurro.de/edmonton2019.html

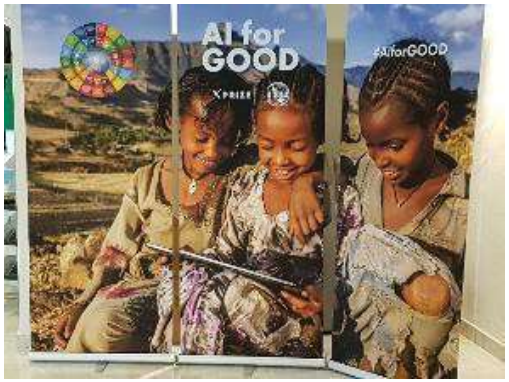
**Nick Bostrom**
https://intelligence.org/files/EthicsofAI.pdf The Ethics of Artificial Intelligence

# DIFFERENT INITIATIVES FOR ETHICAL AI

https://www.iconfinder.com/iconsets/brain-service-2

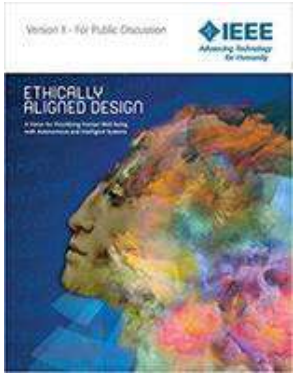
# AI FOR GOOD, AI FOR PEOPLE, …

- Harness the positive potential outcomes of AI in society, the economy
- Ensure inclusion, diversity, universal benefits
- Prioritize UN2020 Sustainable Development Goals
- The objective of the AI system is to maximize the realization of human values




https://ai4good.org/
https://en.wikipedia.org/wiki/AI_for_Good
https://www.microsoft.com/en-us/ai/ai-for-good


https://ec.europa.eu/digital-single-market/en/high-level-expert-group-artificial-intelligence

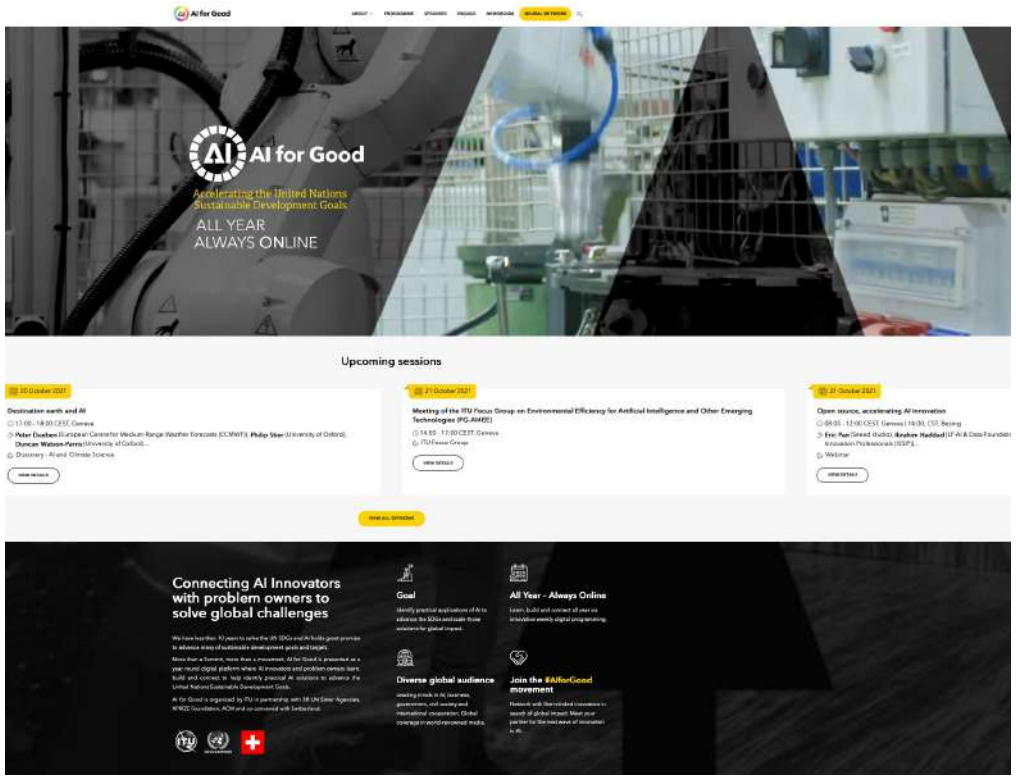



https://ethicsinaction.ieee.org/


http://www.ai4people.eu

Based on: Responsible Artificial Intelligence, Virginia Dignum, https://www.youtube.com/watch?v=BqwVRzKVz30

https://aiforgood.itu.int/ AI for good, International Telecommunication Union (ITU)




"As the UN specialized agency for information and communication technologies, ITU is well placed to guide AI innovation towards the achievement of the UN Sustainable Development Goals. We are providing a neutral platform for international dialogue aimed at building a common understanding of the capabilities of emerging AI technologies."

**- Houlin Zhao, Secretary General of ITU**

# EXAMPLE: UNIFIED FRAMEWORK OF PRINCIPLES FOR AI IN SOCIETY (AI4PEOPLE)

**Non-maleficence**: privacy, security and "capability caution"

**Beneficence**: promoting well-being, preserving dignity, and sustaining the planet

**Autonomy**: the power to decide (whether to decide)

**Justice/Fairness:** promoting prosperity and preserving solidarity

**Explicability**: enabling the other principles through intelligibility and accountability

https://www.eismd.eu/ai4people-ethical-framework/

# RESOURCES

https://deepmind.com/about/ethics-and-society GOOGLE DEEP MIND Ethics & SOCIETY

https://framtidsprao.trr.se/documents/Framtidens_arbetsliv_rapport_WEB.pdf

https://www.youtube.com/watch?v=RXCqKwMHpb0 Ethics of AI @ NYU: Opening & General Issues (1:23:30 - Yann LeCun "Should We Fear Future AI Systems?")

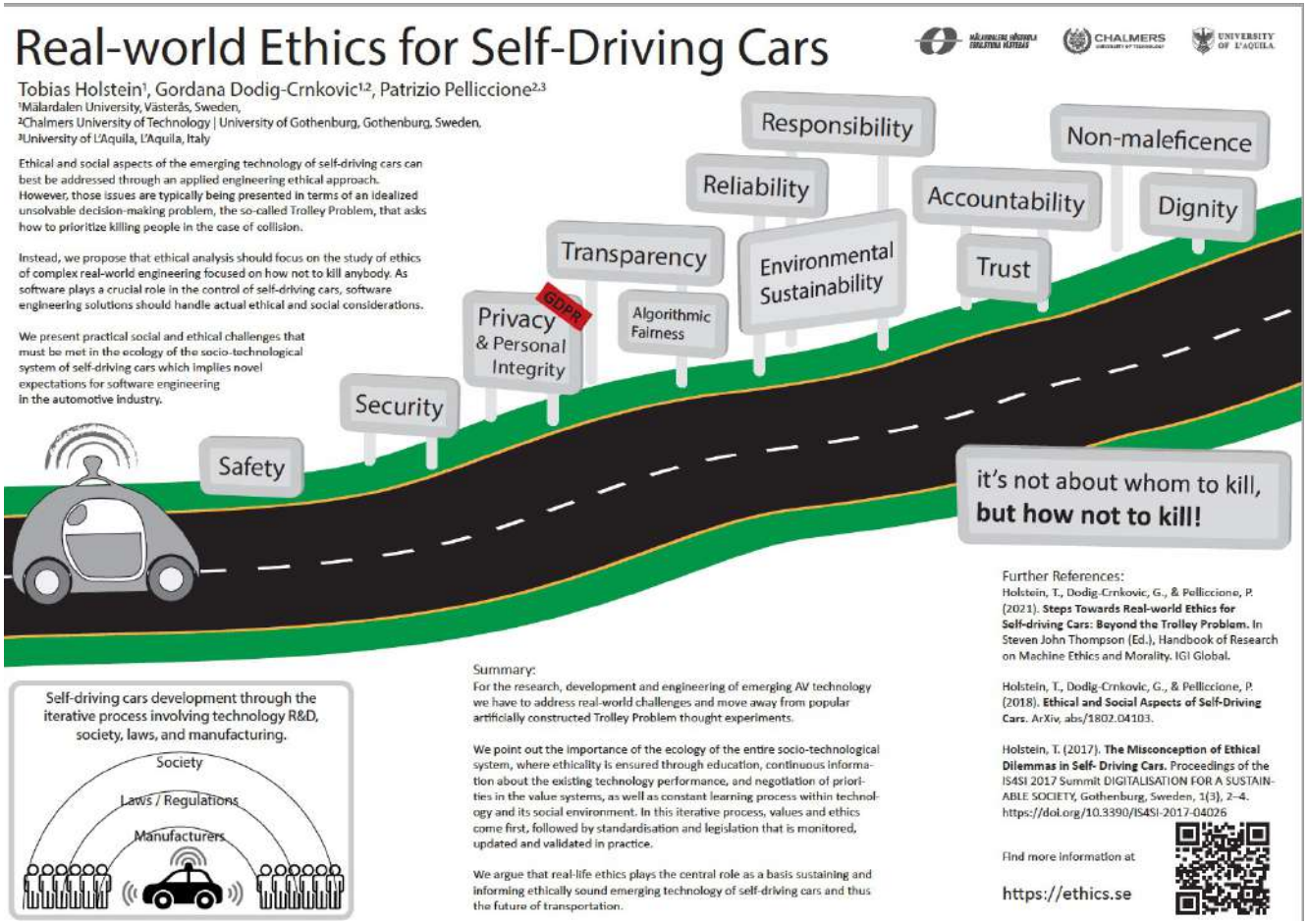
https://www.youtube.com/watch?v=1oeoosMrJz4 AI ethics and AI risk - Ten challenges

https://futureoflife.org/ai-principles/ Asilomar Principles

https://www.microsoft.com/en-us/ai/ai-for-good AI for Earth, AccessibilityHumanitarian Action, Cultural Heritage

https://www.partnershiponai.org PARTNERSHIP ON AI to benefit humanity
Started by Microsoft, Amazon, Google, Facebook, IBM, and Google-owned DeepMind. 2019: 90+ partners, >50% non-profit, 13 countries

# EXAMPLE: EHICS OF SELF-DRIVING VEHICLES




Presented as poster at ICSE2020
Extended version to appear as a chapter in the
Handbook of Research on Machine Ethics and Morality
| IGI Global 2021

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G20. Principles for responsible stewardship of trustworthy AI. https://www.g20-insights.org/wp-content/uploads/2019/07/G20-Japan-AI-Principles.pdf, 2019. Section 1. Accessed 2021-01-20.

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# SUMMARY: ETHICS OF AI

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# HIGHLIGHTS OF ETHICAL ISSUES OF AI

- REGULATION – value-based, codes of ethics & laws
- RESPONSIBILITY
- TRANSPARENCY
- PRIVACY & INTEGRITY. GDPR https://www.gdprexplained.eu
  General Data Protection Regulation – data protection by design
- BIAS/FAIRNESS in machine classification systems (algorithmic bias) & decision-making
- AI-guided weapon Systems - Lethal Autonomous Weapons – security & responsibility
- Agency and moral status of AI
- Future of work & end of employment - job replacement and redistribution
- Human dependency on technology and loss of skills
- Value-misalignment
- Unintended consequences of goals and decisions

# DISCUSSIONS IN BREAKOUT ROOMS

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# DISCUSSIONS IN BREAKOUT ROOMS

- VALUE-SENSITIVE DESIGN
- RESPONSIBLE AI
- DIFFERENT INITIATIVES FOR ETHICAL AI
- ETHICS OF SELF DRIVING CARS
- AlgorithmsWatch. AI Ethics Guidelines Global Inventory. https://inventory.algorithmwatch.org 2020.
- https://www.youtube.com/watch?v=5pM6NFb4tqU Artificial Intelligence: The Ethical and Legal Debate, European Parliament

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