

Neurath's Digital Boat: Responsibility and Possibilities of Change in & of a Digital(izing) World

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DISE Research Group

Connected World - Strategic Theme VU Amsterdam



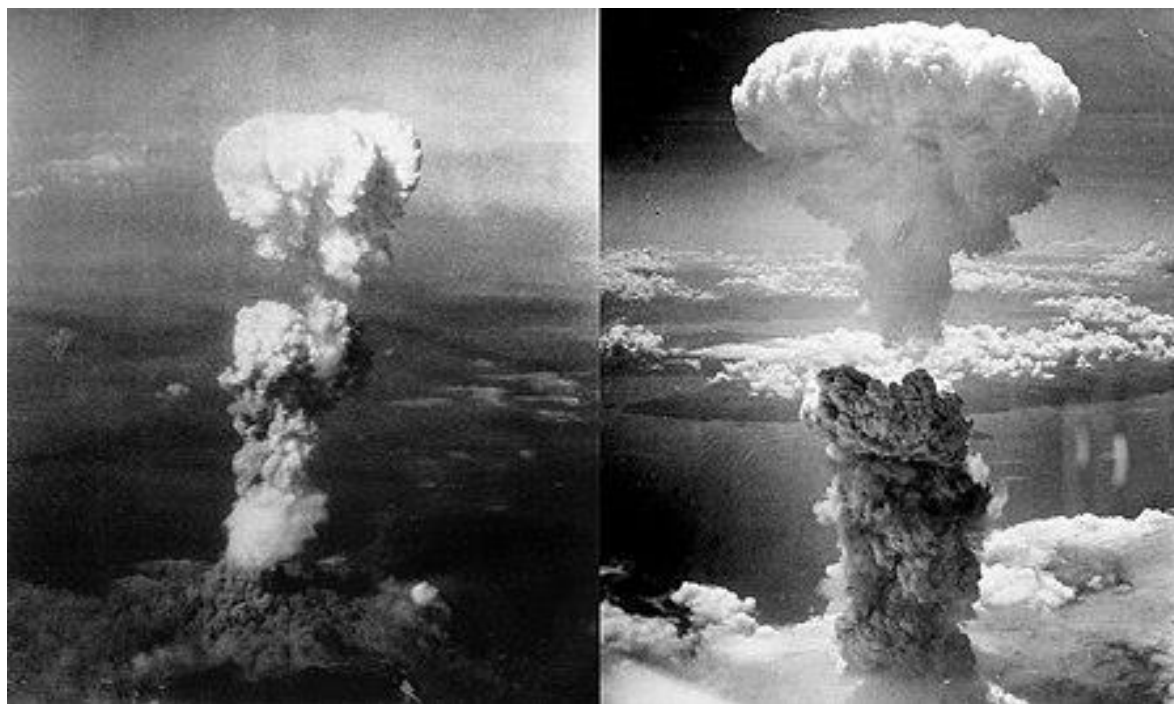
The Network Institute

Vienna Manifesto on Digital Humanism

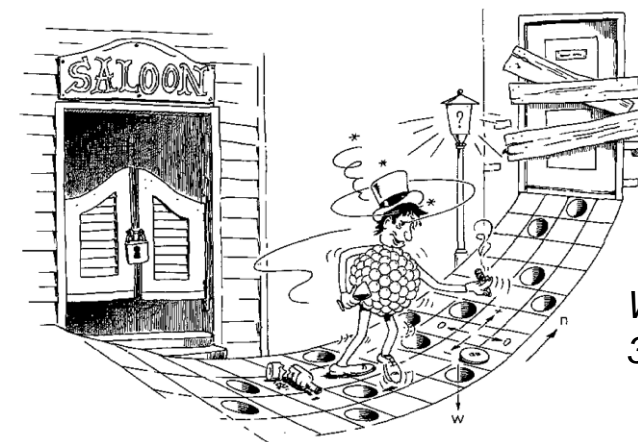
➤ *(May 2019)*

- “ “The system is failing”
- We must shape technologies in accordance with human values and needs, instead of allowing technologies to shape humans
- We are at a crossroads to the future; we must go into action and take the right direction! ”
 - What is the right direction? And how do we know? What is our role in this?
- Responsibility

Responsibility may (perhaps) be new in CS/AI --- *But It Isn't Generally in Science & Technology*



Robert Oppenheimer:
(*Bhagavad Gita, Mahabharata*):
"Now I am become Death,
the destroyer of worlds."



Wim Tukker,
31 August 1982

Fig. 1. Random-walk model of precompound decay. The evolution of a highly excited nucleus is viewed as a random walk allowing for steps in the forward, backward and sideward directions. The holes in the road represent the decay of the nucleus as a result of emission. The value of the exciton number is indicated by the distance from the saloon. The probabilities are such that the walking nucleus will end up somewhere half-way between the saloon and the house, if it is not trapped by a hole before. The lamp-post symbolizes the physicist who attempts to throw some light on the fundamental processes in nature. The description of preequilibrium angular distributions can be viewed in a similar way, albeit that the road should be replaced by a set of concentric spherical shells [1]

DigHum Summer School: Critical Reflectiveness

- 1. Enlightenment: Reason & Rationality
 - *Knowledges, Facts and Values*
- 2. Humanism: “We”, “Humans”
 - *What does “we” really mean and imply?*
- 3. Society/Technology
 - *Determinism, Libertarianism, or ...*
 - *Interactions as complex dynamic (eco)system*
- 4. Ways of Governance
 - *Are we in control? If so, how?*
- 0. Critical Reflectiveness
 - *Interrogate the tacit “idealizing presuppositions”, biases, and background assumptions*

Hannes Werthner
Erich Prem
Edward A. Lee
Carlo Ghezzi *Editors*

Perspectives on Digital Humanism

OPEN ACCESS

 Springer

1. (Digital) Enlightenment

--- What Is (our model of) Reason and Rationality?

Combining Eq. (A14) with Eqs. (A12), (A17) and (A18) we find

$$\tilde{\phi}_i(M, u) = u^{-1} \sum_j [(I - D) R^M]_{ij} q(j, 0). \quad (\text{A19})$$

From Eqs. (A15) and (A19) we finally obtain

$$\begin{aligned} \tilde{q}(i, u) &= u^{-1} \sum_{M=0}^{\infty} (I - D) R^M q(i, 0) \\ &= [u - (\mathbf{P} - \mathbf{I}) \mathbf{D} (\mathbf{I} - \mathbf{D})^{-1} u]^{-1} q(i, 0), \end{aligned} \quad (\text{A20a})$$

and the corresponding Green's function of the random walk in continuous time is:

$$G'_{ij} = [u - (\mathbf{P} - \mathbf{I}) \mathbf{D} (\mathbf{I} - \mathbf{D})^{-1} u]^{-1} \delta_{ij}. \quad (\text{A20b})$$

Comparing Eqs. (A5) and (A20), we see that the solutions of the master equation and of the random walk in continuous time are identical at all times if and only if

$$\mathbf{A} = (\mathbf{P} - \mathbf{I}) \mathbf{A}, \quad (\text{A21a})$$

where \mathbf{A} is a diagonal matrix with elements

$$A_i = u \tilde{\Psi}_i(u) / [1 - \tilde{\Psi}_i(u)]. \quad (\text{A21b})$$

This yields upon inversion

$$\Psi_i(t) = A_i \exp(-A_i t), \quad (\text{A21c})$$

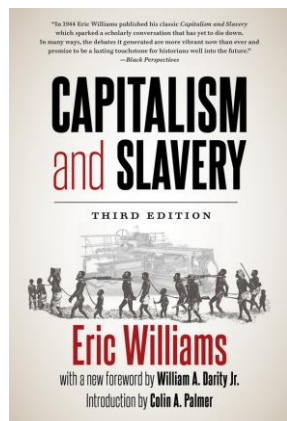
which is the expression for a Poisson process with intensity A_i . This completes the proof.



Enlightenment and Reason

- Enlightenment (likewise, Humanism) is not a coherent “project” as often portrayed, though “Reason” is a common persistent theme
- Many disagreements, already on reason and rationality, e.g. Hume:
 - *Empiricist view on knowledge: empirical data is what the scientific game is about*
 - *Reduction of reason to means-ends rationality (reason as “slave of the passions”)*
 - *Is/Ought gap, so cannot reason from fact to value*
 - (Or: moral reasoning = not really science)

= Manoeuvring values outside of Reason



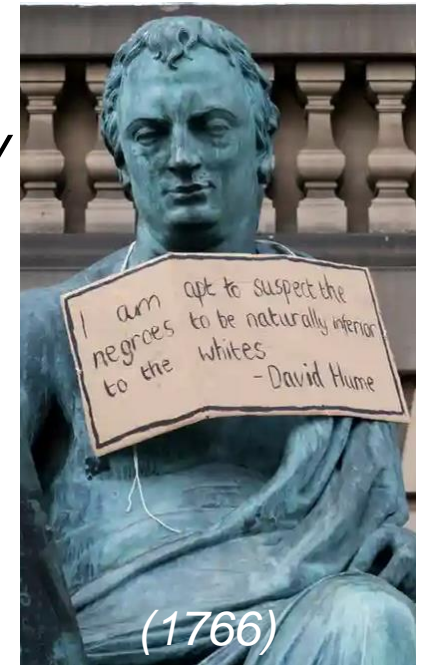
(1944)



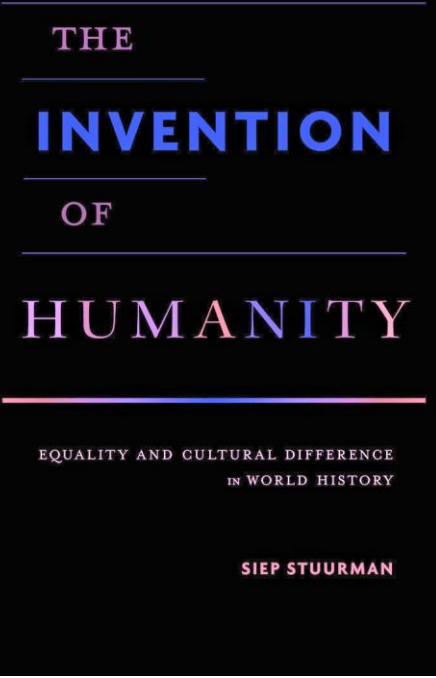
(1739)

Narrow Conception of Rationality Considered Harmful

- Tenets of 20th century logical positivism already visible in Hume
 - *Reduction of rationality to means-ends rational choice considerations only*
 - *Textbook ideas of “the scientific method” (as if following a set of empirical data recipes)*
 - *Social science as “spectator science” of facts, modelled after math and natural science*
 - *“Objectivity” as being not-involved, neutral, disinterested (so, not responsible)*
- Human values declared to be outside of science
 - = *Ignoring societal biases also brought in by science and technology*
 - = *Denying your responsibilities as scientist/technologist*
- All this is still very much alive in practices of science
 - *although philosophically most of it discredited*
- 21st century Digital Science has to re-assess all this
 - *Also from a professional/practice point of view (“phronesis”)*



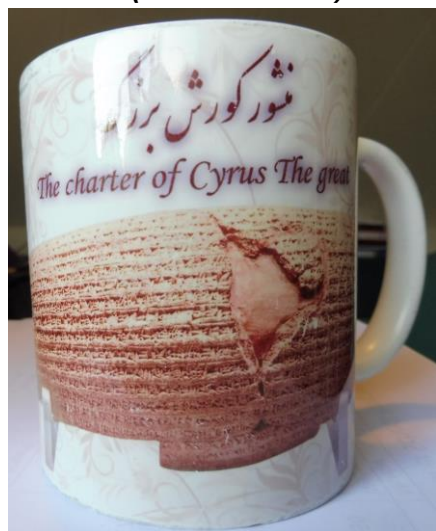
(2017)



2. (Digital) Humanism

--- What Is (our model of the) Human?

(539 BCE)



(1739)



(current)

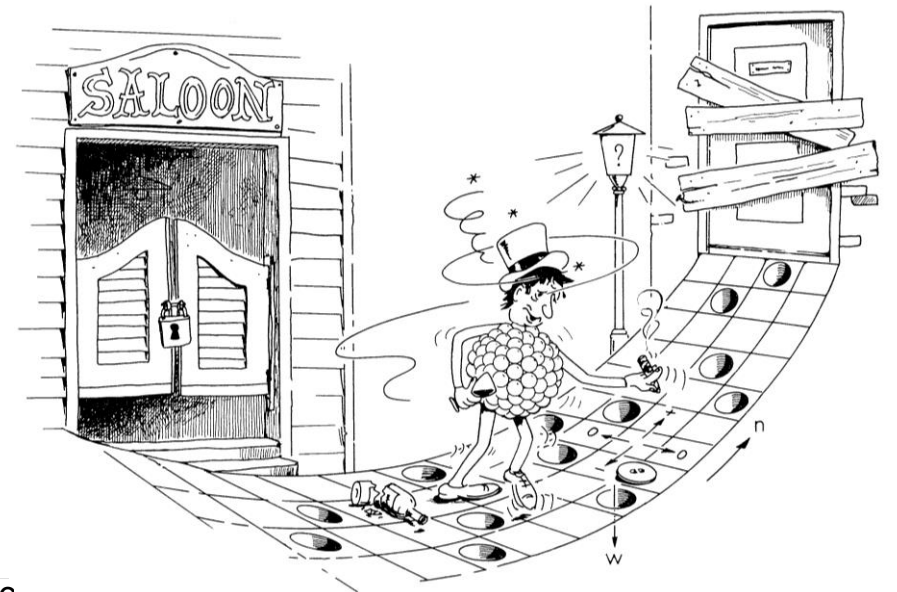


A (One) Model of the Atomic Nucleus

- Clearly idealized and simplified (a standard procedure in physics)
- but good enough for certain scientific goals (**however, to be proven**)
 - (such as prediction of reaction cross-sections)
 - *Issue: Physicists at some point tend to be carried away by their models, and then mistake them for reality --- and this error spills over to economists, psychologists, computer scientists, policy makers,*
 - *Note: neutrons don't talk back, but humans do*

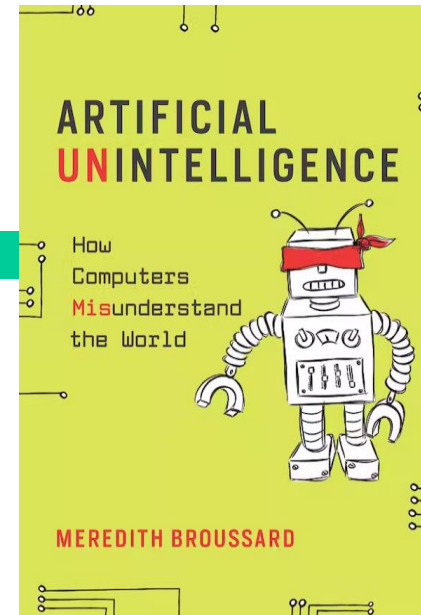
In principle, there is not even necessarily much wrong in, say, a flat-earth assumption, however

Fig. 1. Random-walk model of precompound decay. The evolution of a highly excited nucleus is viewed as a random walk allowing for steps in the forward, backward and sideward directions. The holes in the road represent the decay of the nucleus as a result of emission. The value of the exciton number is indicated by the distance from the saloon. The probabilities are such that the walking nucleus will end up somewhere half-way between the saloon and the house, if it is not trapped by a hole before. The lamp-post symbolizes the physicist who attempts to throw some light on the fundamental processes in nature. The description of preequilibrium angular distributions can be viewed in a similar way, albeit that the road should be replaced by a set of concentric spherical shells [1]

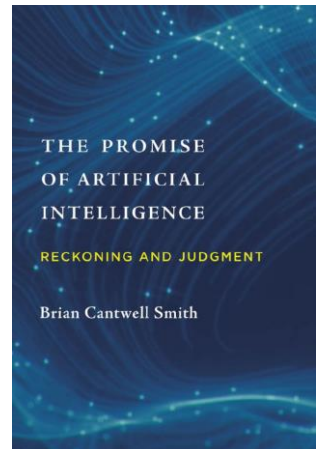


A (One) Model of the Human --- Human as Computer

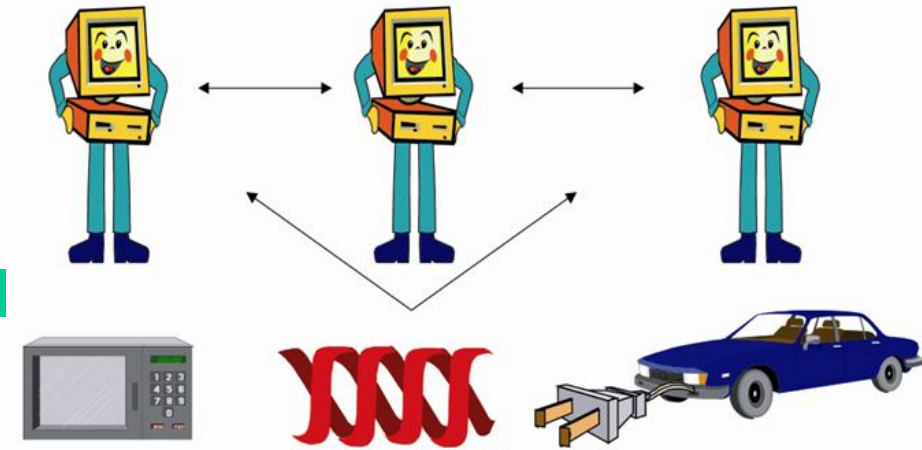
- Human simplified to “intelligence”
- Intelligence reduced to “brain”
- Brain reduced to “computational” device
 - *This is the basic scheme in e.g. Tegmark’s Life 3.0 (2017)*
- “*Being human in the age of Artificial Intelligence*” is then being some sort of computer (Broussard (2018) calls this techno-chauvinism)



- Reflective Questions:
 - Q1: *Is this a model of the human that is anywhere near correct in terms of the facts?*
 - Q2: *Is this a model where we would like humanity to go?*
 - Q3: *Is the approach as a whole **ethically responsible**? And relatedly Q4 on **bias**:*
- **Who is The We?** in “We” Humans: truly inclusive of everyone, or:
 - *White, male, western, techno-chauvinist, capital-rich,: standpoint rather than universal?*

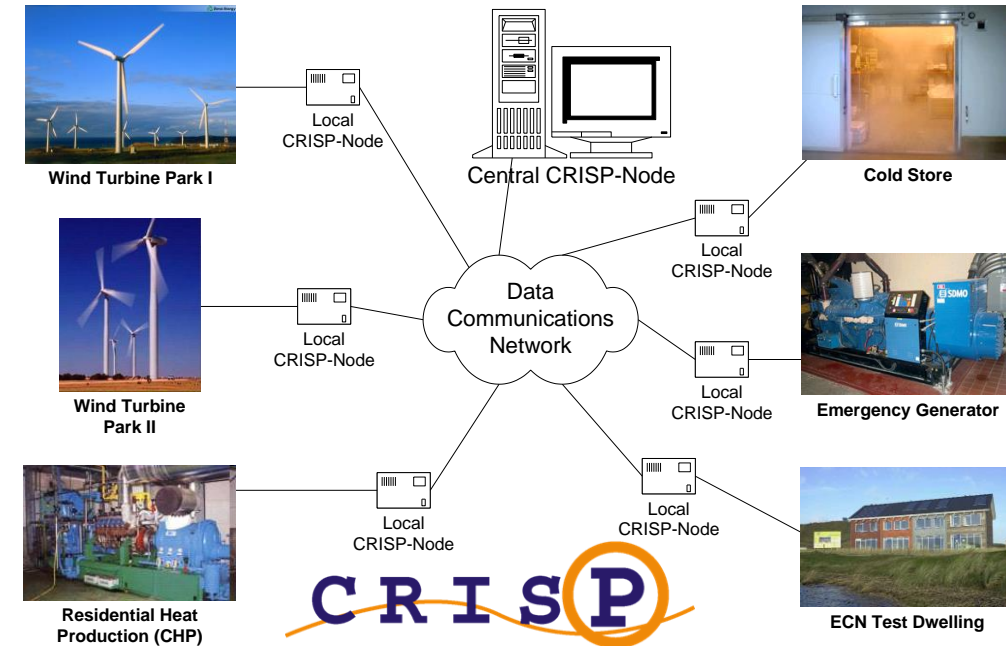


Human modelled as Economic Agent on Market



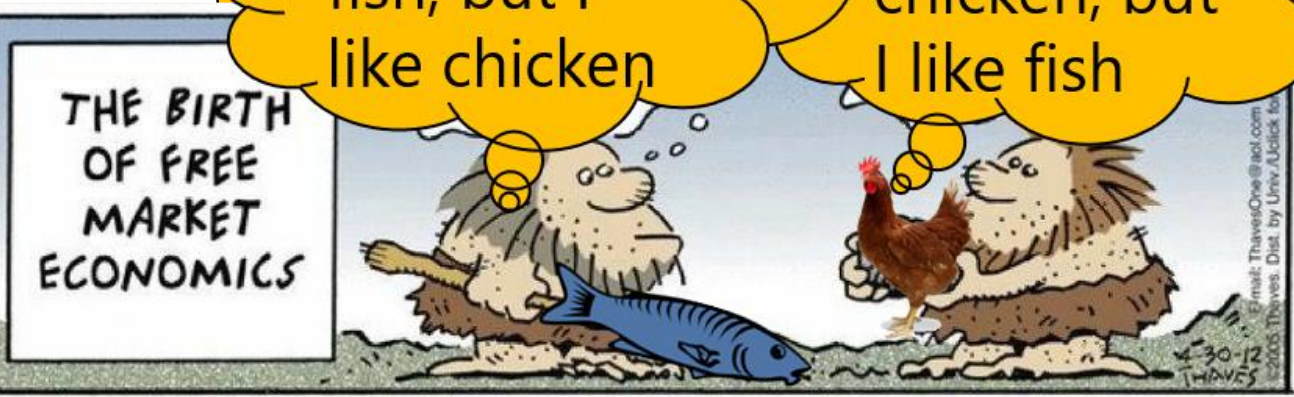
A "Society" of Intelligent Devices

(Smart Energy Grid projects , 1995-2006)



I don't like fish, but I like chicken

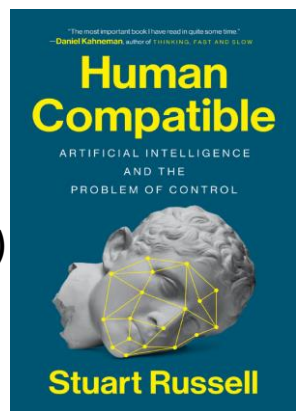
I don't like chicken, but I like fish



xxx BAS
(Before Adam Smith)



(NY stock exchange, 1850)



(2019)

Narrow Conception of Human Considered Harmful

- Reflective Questions:
 - Q1: Will a narrow conception of humanity not easily lead to very misleading conclusions and on science, technology and society?
 - Q1: Are models of the human underlying Digitalization and AI future analysis and policy sufficiently **real and inclusive**?
 - Q3: Are analysis and policy thinking on Digitalization and AI futures responsibly done in giving a picture of the implications for the **lives of real people**?
 - *Balanced, fair, inclusive, not just promotional, biased, or susceptible to political abuse?*
 - *The responsibility not to be irresponsible*

3. Society/Technology: Technological Determinism? Libertarianism? Or: Do Artefacts Have Politics?



THE BELOUSOV-ZHABOTINSKII REACTION: CHEMICAL SCROLL WAVES

Spiral chemical waves develop when the Belousov-Zhabotinski reagent is allowed to stand in a shallow dish. The waves can appear spontaneously or be initiated by touching the surface with a hot filament, as in the photographs above. The small circles are bubbles of carbon dioxide evolved by the reaction (see the section on coherent structures in chemistry and biology in chapter 5). After the initial photograph was taken, subsequent ones were taken at 0.5, 1.0, 1.5, 3.0, 4.5, 5.5, 6.5, and 8.0 seconds. Photographs by Fritz Gorio.

US tests of robotic patrol dogs on Mexican border prompt outcry

Civil liberties group urges Washington to cancel programme to prevent 'slide into anti-immigrant dystopia'



📷 The unarmed 45kg robots will be able to walk on natural and human-built terrain.
Photograph: Courtesy Ghost Robotics

The US is testing robotic patrol dogs along its frontier with Mexico that it says could provide “mechanical reinforcements” for border guards, in a move criticised by a leading domestic rights group as a “civil liberties disaster”.

Adding to the outcry, the company that developed the dogs, Ghost Robotics, has previously [showcased a four-legged robot that has a sniper rifle](#) attached to its back.

“Benevolent” AI? (FLI) The Slippery Slope Scenario

- Officially, this may be first directed against (clearly illegal) criminal drugs trafficking across the border
- Then, one may slowly widen the purposes of police patrolling
- E.g. against (illegal) immigration
- Next, a *stand your ground* principle might be invoked against “intruders” (of course, because they are illegal)
 - (with AI robot dogs carrying rifles?)

Yet Another Specimen of “Ethical” AI --- A Techno-Moral Imperative (?)

US has 'moral imperative' to develop AI weapons, says panel

Draft Congress report claims AI will make fewer mistakes than humans and lead to reduced casualties



Activists from the Campaign to Stop Killer Robots protest in Berlin in 2019. Photograph: Annegret Hilse/Reuters

The US should not agree to ban the use or development of **autonomous weapons powered by artificial intelligence (AI) software**, a government-appointed panel has said in a draft report for Congress.

The panel, led by former Google chief executive Eric Schmidt, on Tuesday concluded two days of public discussion about how the world’s biggest military power should consider AI for national security and technological advancement.

Its vice-chairman, Robert Work, a former deputy secretary of defense, said autonomous weapons are expected to make fewer mistakes than humans do in battle, leading to reduced casualties or skirmishes caused by target misidentification.

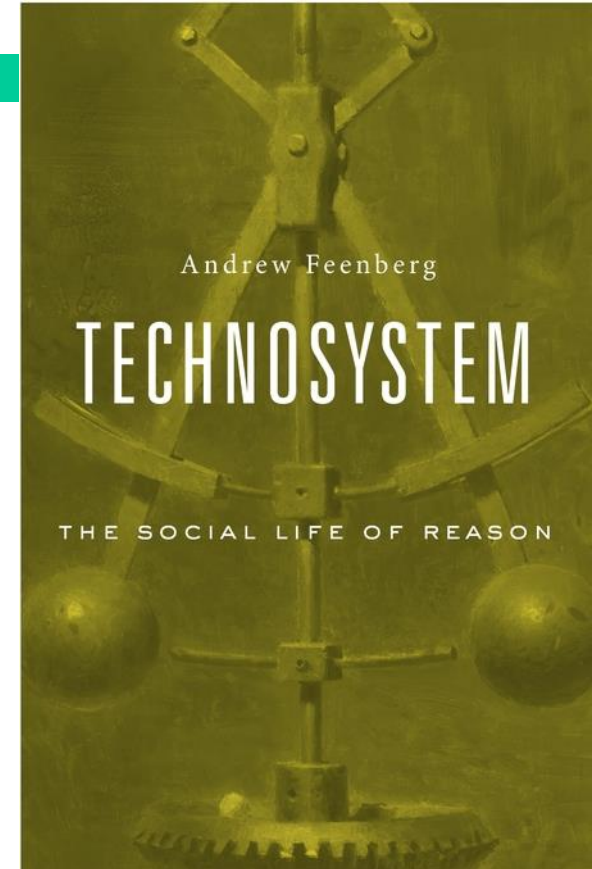
“It is a moral imperative to at least pursue this hypothesis,” he said.

- Note “scientific” language: “hypothesis” (but obviously politically exploited; value-neutrality evaporated)
- Kant’s categorical imperative (1785) seems hopelessly outdated for this brave new 21st century digital world
- ***Burning reflective questions:***
- Q1: What if the “hypothesis” turns out not to be true?
- Q2: If USA has such a “moral imperative”, who hasn’t?

The Guardian, 26Jan2021

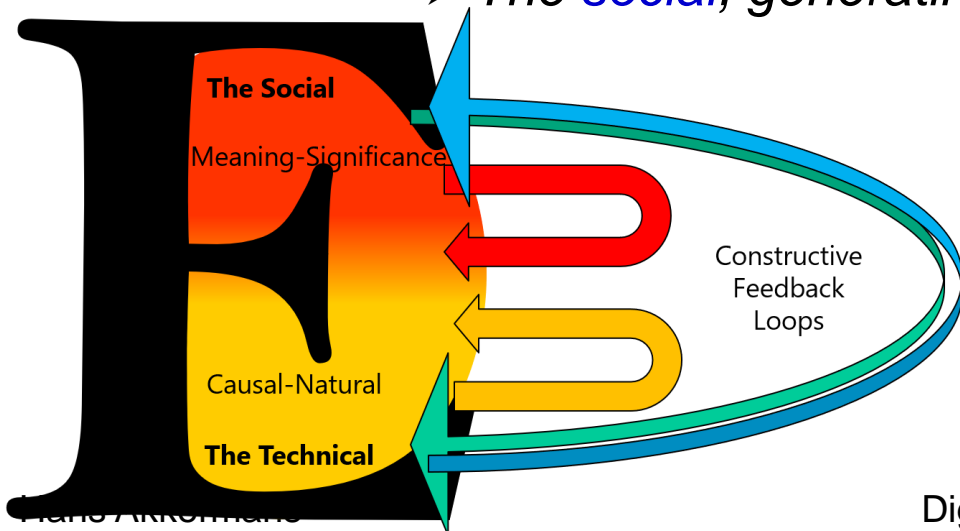
Interaction Technology – Human/Society

- Received view: Science & Technology as “**The Extension of Man**” (Bernal, 1939)
- Q: or is it rather the other way around? Man as hostage of or “enslaved by” technology?
- Philosophy of Technology:
 - *Lukács (1923) Reification (Verdinglichung)*
 - *Heidegger (1954) Enframing/resource (Gestell/Bestand)*
 - *Foucault (1970) Power/Knowledge, the order of things*
 - *Langdon Winner (1980) Do Artefacts Have Politics?*
 - Striking similarity of techno-political discussions then and today!
 - *Feenberg (1999/2017): Two-level (natural [causal] and social-cultural [meaning/significance]) Instrumentalization Theory; democratization*



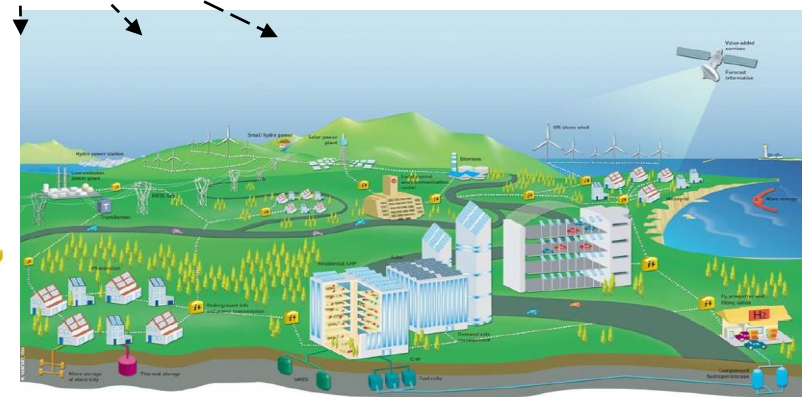
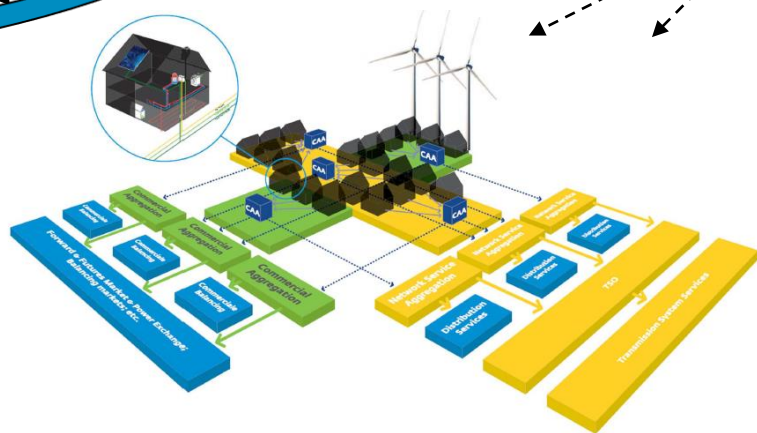
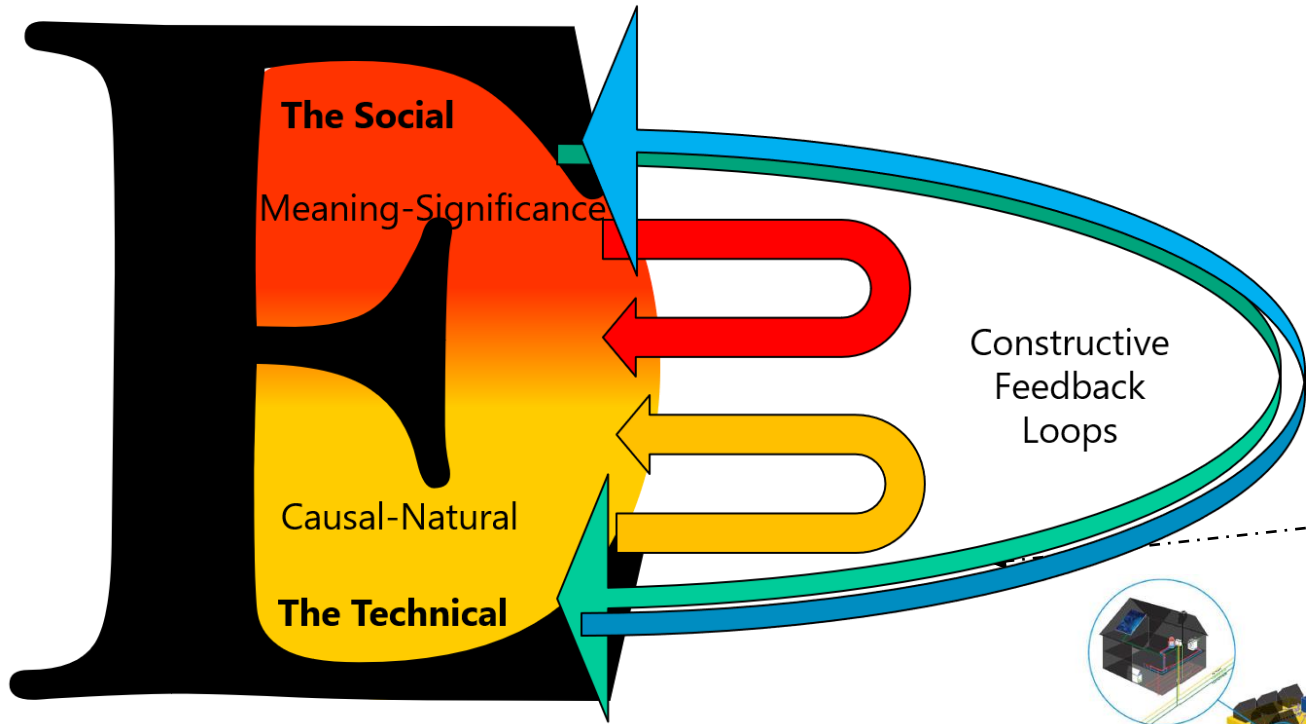
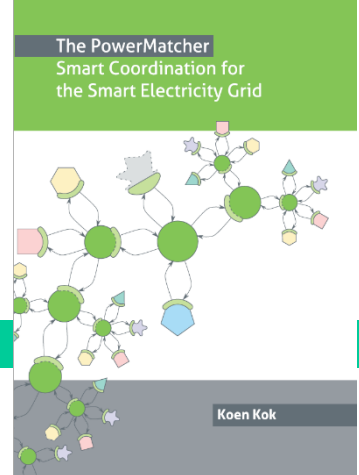
Technology as Functionalizing the World

- **Society/Technology** complex (in Foucault “notation”)
 - Four “feedback/control loops” with natural/technical/causal effects as well as social-consequence and social-construction characteristics
 - *The **technical**, generating further construction of the **technical** and its evolution*
 - *The **technical**, generating **social** effects, constraints and requirements*
 - *The **social**, generating other **social** consequences and requirements*
 - *The **social**, generating construction of **technical** implications and requirements*



- Technology as “the extension of man”?
- Or “man as the extension of technology”?
- **Answer: both** (cf Vienna DigHum Manifesto)

Example: Renewable Energy Sources in Smart Electricity Networks

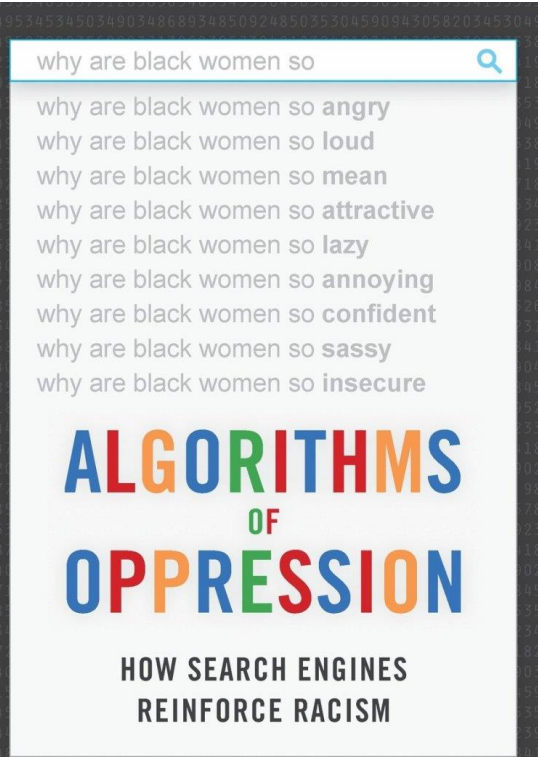


- Feenberg: other example: the internet
- Because of multiple pathways also due to public influences, more democratic technology pathways are possible

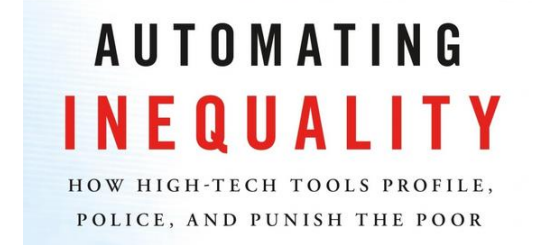
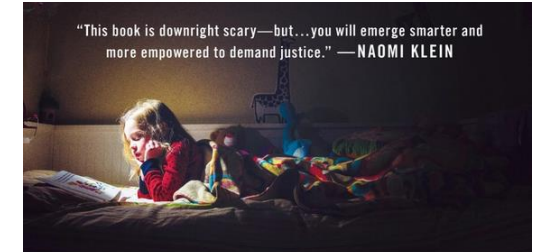
Figure 2.8: "Future Network Vision" of the European SmartGrids Platform [26]

Do Digital Artefacts Have Politics?

- “Anything Goes” (Feyerabend) & can be sold as “ethical”
- Beyond speculating about imagined future life, it may be insightful to investigate current, really existing lives
 - E.g. Noble, 2018; Eubanks, 2017, and:



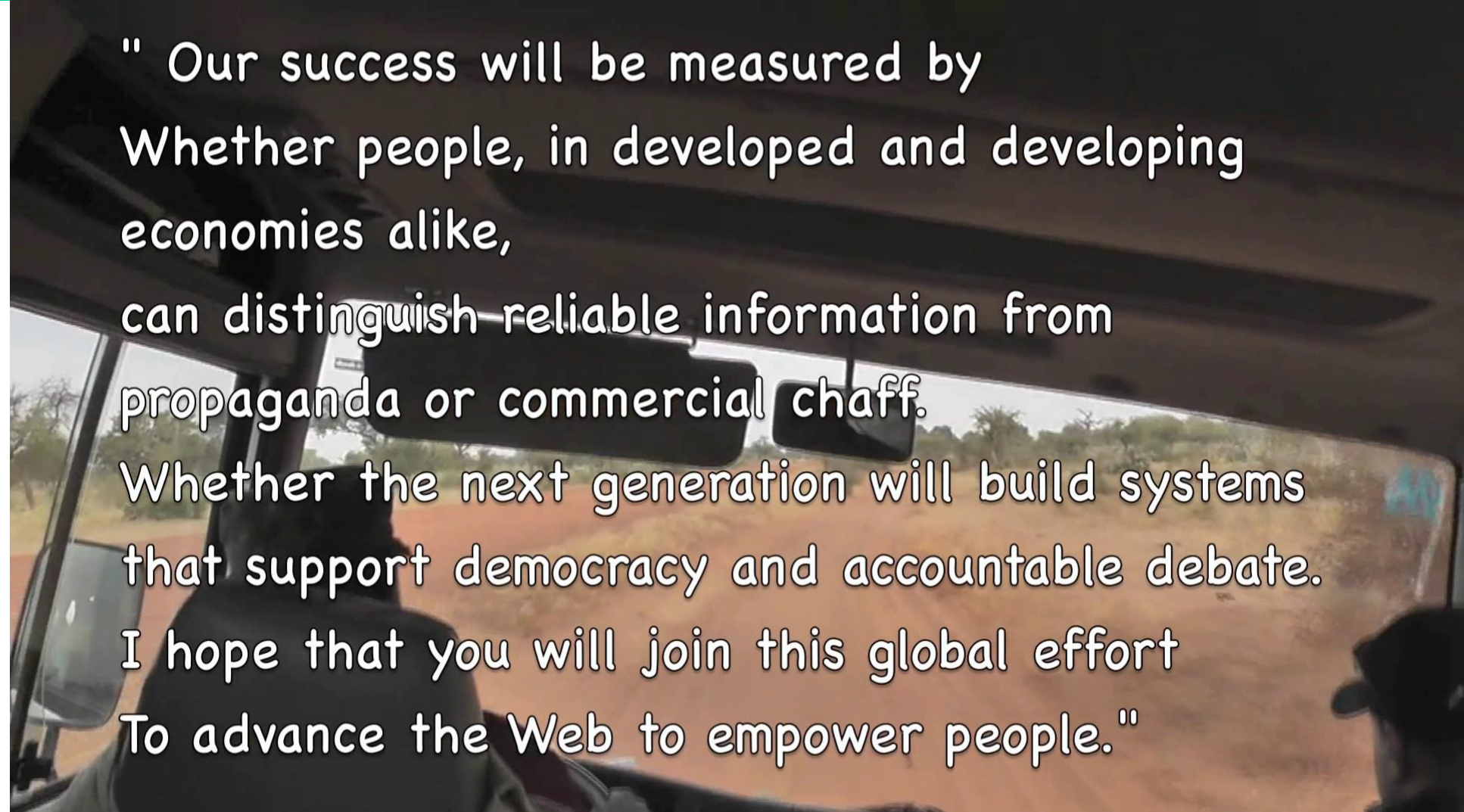
“The VU proctoring software didn’t recognize me as a human being”, Robin Procornie, bio-INF student VUA, 15 July 2022



4. Governance: Hippies, AIs, & Political Naïveté



Tim Berners-Lee (2009/2018): World Wide Web (designed) as Empowering Mechanism



" Our success will be measured by Whether people, in developed and developing economies alike, can distinguish reliable information from propaganda or commercial chaff. Whether the next generation will build systems that support democracy and accountable debate. I hope that you will join this global effort To advance the Web to empower people."

What About the Hippies?



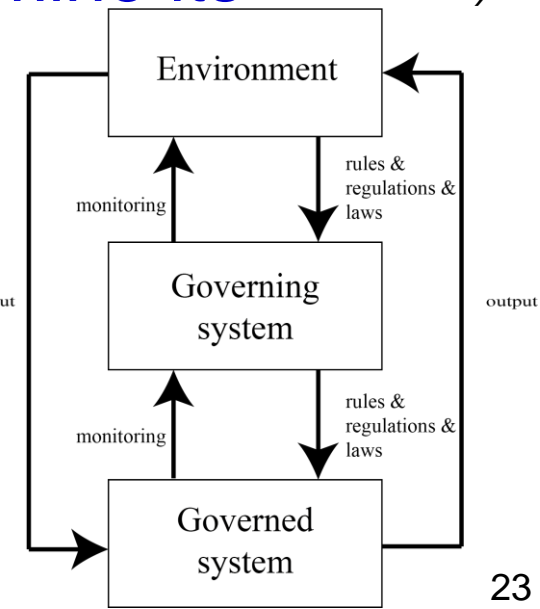
- Internet/Web has for a long time been seen as a “liberating” “free” public space for knowledge sharing, critical societal debate etc.
 - *Counterculture “hippie” values, cf. Communications of the ACM, Summer 2018*
- Naïve or not?
 - *Indeed, Internet/Web has changed drastically in directions of commercial and state mass surveillance, control, and exploitation*
 - *Yet, there are still significant spaces that are community-based, “open”, “free”, etc.*
 - *Naïve is not the original ideal, but an expectation that a desired state, once reached, “automatically” or effortlessly stays so. Nothing good (or even bad) comes without effort*
- **Human Values, Social Justice, Democratic Rights are to be explicitly asserted, and struggled for, over and over again (SDGs)**
 - *Not automatic “spill-over” from real society to digital society; + rights are not irreversible*

Are We In Control?

Technology and its Governance

- Technology and its Governance model to be distinguished
 - *Technology decentralized, but its governance centralized (e.g. blockchain/bitcoin)*
- Internet/Web: in mixed governance state of community models, business consumerist models, and state hierarchy models
- => Characteristics of technology do not (fully) determine its evolution nor its governance control structure
 - *Hence, degrees of freedom always exist for (re)design*
- Digital Technology *itself* can be instrumentalized as technology for governance and control functionality
 - *For better or worse!*

(Gordijn, 2020)



Governance Paradigms: Markets, Hierarchies, Commons

- Markets
 - *Allocation of resources, based on **competition***
- Hierarchies (State, Bureaucracies)
 - *Regulation of resources, based on **rules and enforcement***
 - *BigTech platforms!*
- Commons
 - *Agreed arrangements for shared use of resources, based on **collaboration** and joint responsibility: a **citizenship** model. Often downplayed or ignored, but*
 - Surprising variety of them exist, also in the digital world
 - *E.g. Creative Commons, Wikipedia, Audacity, Open Access, Open Source, etc.*
- Note: different underlying models of the human as social being



The Evolution of Institutions
for Collective Action



Political Economy
of Institutions and Decisions

TINA: Is There No Alternative?

- The Problem with Technological Determinism
- and Techno-Chauvinism:
- It is not true
 - *Neither the utopian nor the dystopian versions*
- Belief in it causes passivity and complacency
 - *But: No time and space for complacency in the digital age*
- It creates hooks for political rhetoric and manipulation
 - *TINA, as a Reborn Thatcher would say*
- It shifts socio-political attention and agenda with **focus on the wrong spots**



0. Critical Reflectiveness:
=> Good Intentions Are Good
--- But Not Good Enough!

What's Special About Humans from a Digital Technology Standpoint? Or: What makes humans truly “human”?

- In my view, it is not “intelligence”
 - *Certainly not if reductively viewed as a brain-internal computational capacity*
- What misses here (and in AI sci-fi) is that humans are (a species of) social beings (communicative, collaborative, coordinative)
 - *Which is a model of the human very different from a computational or competitive one*
- Human’s **social relationality** lies at origin of “typically” *human* traits
 - *empathy, altruism, morality; concepts as human dignity, equality, freedom, social justice*
- Complexity of society/technology and its evolution is ignored
- Reflective Q: isn’t it rather our social relationality and positionality that brings forth our thinking and intelligence?
 - *If so, intelligence, individual, identity, ... is not brain-internal but outside world-relational*

Neurath's Boat (1913/1921)



- “We are like sailors who on the open sea must reconstruct their ship but are never able to start afresh from the bottom. Where a beam is taken away a new one must at once be put there, and for this the rest of the ship is used as support. In this way, by using the old beams and driftwood the ship can be shaped entirely anew, but only by gradual reconstruction.”
 - *Otto Neurath* (co-founder Vienna Circle)



Studying and Influencing Digital TechnoSocial Systems (DigHum Roadmap, June 2022)

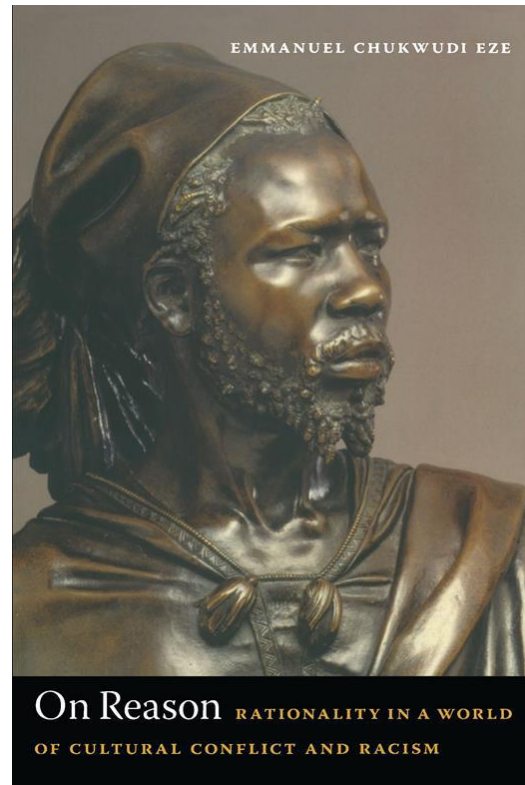
- A set of urgent research, innovation, education topics, + beyond:
- Reflective Q: Should notions such as reason, rationality, objectivity, scientific method, **themselves** not be scrutinized?
 - And be reconstructed, in order to fit a Digital Technosocial Age?
 - Thereby be **humanized and socialized**?



- *To keep “techno” dominated thinking within proper perspective and bounds*
- *As alternative to a foundationalist approach of science and humanities, restrictively modelled after mathematics and natural science*
- *E.g. Sandra Harding: “strong” objectivity = fair to evidence, fair to critical objections, + account for views and life experiences of all relevant societal actors and stakeholders*
- *Sciences “from below”: inclusive of all “who suffer the consequences” (positively or negatively) of (in this case) the digital world and its ongoing digitalization*

(2015)

Reconstructing Reason for a Human Digital Age



(2008)

- Eze: Reason is brought forth by and is because of diversity, “otherness”. Its basis lies in **human experience** and its **history**
 - *(Thus: Reason is in the human relational world, not in the brain)*
 - *“Reason has a colour”*
- Toulmin: formal rationality vs Reason as (situated) “reasonableness”
 - *“Warm hearts allied with cool heads seek a middle way between the extremes of abstract theory and personal impulse. The ideals of practical thinkers are more realistic than the optimistic daydreams of simple-minded calculators, who ignore the complexities of real life, or the pessimistic nightmares of their critics, who find these complexities a source of despair”*
 - *“Reason has always existed but not always in a reasonable form”* (



(2001)

What's The Point? Digital TechnoSociality:

- 1. We have to uphold Reason in the Digital Society as well
- 2. But: a reconstructed Reason incorporating and scrutinizing both facts and values, a Reason that is humanized and socialized
- 3. Good intentions are good, but not good enough! Ethics has a social-systemic character, not just an individual one
- 4. Narrow conceptions of “we, humans” considered harmful
- 5. Society/Technology as a dynamic complex adaptive system
- 6. For the Digital Society, we are all in the same Boat as Neurath
- 7. Not easy, but no TINA: there are degrees of freedom for (re)designs in/of Digital Technology & Society and its governance

Slides Standing Reserve



Digital Technologies & ICT/Internet/Web Systems: Technical – SocioTechnical - TechnoSociality

CS as a Monodiscipline: From (Mathematical) Machine to Something (Vaguely) Social

Edsger W. Dijkstra, Communications of the ACM, Vol 11, No 3, March 1968



Go To Statement Considered Harmful

Key Words and Phrases: go to statement, jump instruction, branch instruction, conditional clause, alternative clause, repetitive clause, program intelligibility, program sequencing

CR Categories: 4.22, 5.23, 5.24

EDITOR:

For a number of years I have been familiar with the observation that the quality of programmers is a decreasing function of the density of **go to** statements in the programs they produce. More recently I discovered why the use of the **go to** statement has such disastrous effects, and I became convinced that the **go to** statement should be abolished from all “higher level” programming languages (i.e. everything except, perhaps, plain machine code). At that time I did not attach too much importance to this discovery; I now submit my considerations for publication because in very recent discussions in which the subject turned up, I have been urged to do so.

My first remark is that, although the programmer's activity ends when he has constructed a correct program, the process taking place under control of his program is the true subject matter of his activity, for it is this process that has to accomplish the desired effect; it is this process that in its dynamic behavior has to satisfy the desired specifications. Yet, once the program has been made, the “making” of the corresponding process is delegated to the machine.

dynamic progress is only characterized when we also give to which call of the procedure we refer. With the inclusion of procedures we can characterize the progress of the process via a sequence of textual indices, the length of this sequence being equal to the dynamic depth of procedure calling.

Let us now consider repetition clauses (like, **while B repeat A** or **repeat A until B**). Logically speaking, such clauses are now superfluous, because we can express repetition with the aid of recursive procedures. For reasons of realism I don't wish to exclude them: on the one hand, repetition clauses can be implemented quite comfortably with present day finite equipment; on the other hand, the reasoning pattern known as “induction” makes us well equipped to retain our intellectual grasp on the processes generated by repetition clauses. With the inclusion of the repetition clauses textual indices are no longer sufficient to describe the dynamic progress of the process. With each entry into a repetition clause, however, we can associate a so-called “dynamic index,” inexorably counting the ordinal number of the corresponding current repetition. As repetition clauses (just as procedure calls) may be applied nestedly, we find that now the progress of the process can always be uniquely characterized by a (mixed) sequence of textual and/or dynamic indices.

The main point is that the values of these indices are outside programmer's control; they are generated (either by the write-up of his program or by the dynamic evolution of the process) whether he wishes or not. They provide independent coordinates in which

“Pure or Core” CS
framed as
mathematical
machine oriented
discipline
--- i.e. a purely formal-
technical paradigm

MonoDisciplines Change: (1) Under Influence of other Disciplines (2) Broader Societal Changes

- Subsequently, intrusion and “fighting in” of
 - Human Computer Interaction (HCI)
 - Artificial Intelligence (AI)
 - Information Systems in Organizations (IS)
- Emergence of notion of “sociotechnical” systems
- Resisted as non-technical (“human factors”, “soft”) and even worse, non-formal in eyes of pure CS
- Even Software Engineering (SE) has been suspect (technical, yes, but not formal enough)
 - Therefore, practically useful but “not really scientific” (Note: (1) math as the model of scientific rationality; (2) very hierarchic view of “scientificness”)
- Today, “immigrants” SE, HCI, AI, IS standard fare in CS curricula

TechnoSociality: Digital Society is not a SocioTechnical System – It's More Social Than That

“Sociotechnical” is a step forward but has flavour:

- First is technical
- Second come social aspects, as add-on

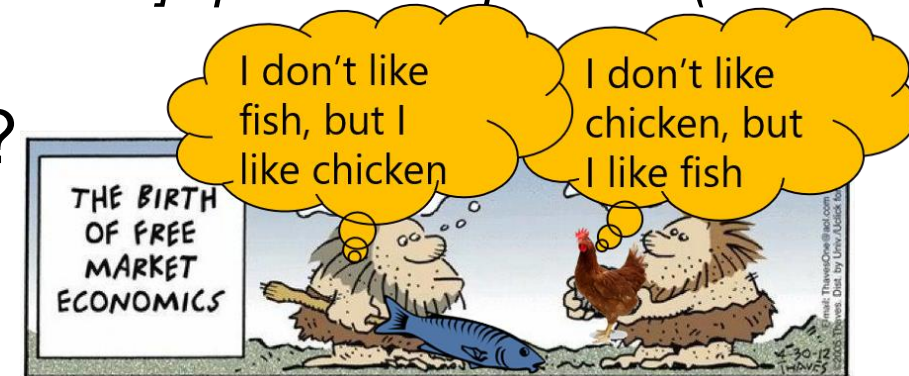
- Sociotechnical = technical + social aspects added
- What about systems where social aspects dominate; technical aspects are present but are secondary?
- I would claim: plenty of them currently in our Digital Society
- We need a characterization of systems where social aspects dominate and technical ones are relevant but come second:
- I suggest: **technosocial** systems
 - *Cases in point: Social Media, Business Platforms, Innovation Ecosystems*
 - **Note: Understanding then centres more in the social mechanisms at play rather than in the technical features**

Being An Expert Does Not Warrant Forms of Academic Arrogance or Elitism

- (Neither is being filthy rich or famous)
 - *(But that is not the real problem in this room)*
- Experts **do** have special knowledges as contribution to societal public debate
- Experts usually have a limited (monodisciplinary) field of expertise
- They are typically not used to or are hesitant to engage in broader trans/interdisciplinary (non-)scientific discussions
- Nor are they properly representative of the general citizen
- **But policy making and public opinion formation must include all this**
 - *This unavoidably affects social role and responsibility of scientists/technologists*

A (One) Model of the Human: Rational Choice, by a Utility Maximizing Individual

- Clearly idealized and simplified (standard procedure in economics)
- Human agency is reduced to simple form of economic agency: individual acting on free market for his own utility maximization
 - Typically theoretically supported by Adam Smith's "invisible hand" argument
 - Mathematically, this is a highly idealized [computational] optimization problem (cf. Walras, *tatonnement*, around 1870)
- Good enough for certain scientific goals?
 - (to be proven)
- Adequate for sensible discussions that involve values and ethics?
 - Dubious at best



Human modelled as Self-Interested Individual on Free Market (2)

- Conceptual, + mathematical, basis of neoclassical economics
 - *(see so many introductory university economics/business textbooks)*
- Expresses a non-social relation-less model of the human
 - *Competition only, but absence of social relations, collaboration, empathy,....*
- Linked to reductionist view of reason as means-ends rationality
 - *Consequence: stakeholder ends and goals are outside of the scientific discussion*
- In ethically responsible and democratic deliberation, construction of goals and discussion of their “reasonability” are a central part

What's Special About Digital Technology from a Human Standpoint?

- Digital technology comes close to humans, more than most other technologies
- As its functionalities are fundamentally in communication and (social action) coordination
- + Tremendous reduction of that in time (speed) and space (scale)
- = Capabilities seen as central to humans as social beings
- Moreover, Digital Technology can be well instrumentalized for functionalities of governance and control (also over humans)
 - *The next step beyond surveillance*
 - *“Computer says NO”*

Neurath's Boat (2)

- Non-Foundational view (as opposed to Cartesianism)



Neurath's Boat --- Update (circa 2000 CE)



"We are building planes --- in the air"



*Now, the future life task
for E. Musk is also clear*

